MARCH, 1945

Industrial FINISHING

Published Monthly in the Interest of Product Cleaning and Painting

TECHNOLOGY DEPT.
MAR 26 1945
DETROIT

LILLY VARNISH COMPANY
Indianapolis, Indiana
THE LILLY COMPANY, High Point, North Carolina

These Insignia are displayed here as a tribute to our hard hitting armed forces whose stinging blows now have our enemies reeling. Keep 'em reeling boys—deliver the knockout punch soon.

RINCONTROL

THE IMPROVED TEXTURED ENAMEL FINISH

Write for this booklet about Rincontrol. It contains a finished panel and specific information about a durable, one-coat finish that has been widely used in war production and is now available for general industrial applications.

PICTURE YOUR PRODUCT FINISHED WITH EYE-APPEALING RINCONTROL

ROXALIN *Flexible* FINISHES
INCORPORATED
ELIZABETH, N. J. • NEW JERSEY

Health hazards of Pickling Minimized

HOT SULPHURIC ACID PICKLES evolve fumes irritating to the throat during the pickling of steel. These fumes are physiological hazards to operators as well as corrosive hazards to surrounding steel structural work and equipment.

ENTHONE ACID ADDITION AGENT forms a foam that traps fumes and spray. It also reduces attack on the steel, promotes better wetting and acid contact with the work. It can be used in plating cycles because it is stable and free rinsing and does not interfere with plating adhesion.

THE LOW COST OF 20 CENTS to modernize 25 gallons of pickling solution pays dividends in happier, healthier workers for hundreds of users of Acid Addition Agent, not counting the better pickling obtained.

NEW LITERATURE ON REQUEST. It gives nine other important reasons why you should use AAA as well as technical data on pickling. Write today for "Modern Pickling of Iron and Steel" and also a FREE SAMPLE of Enthone Acid Addition Agent.

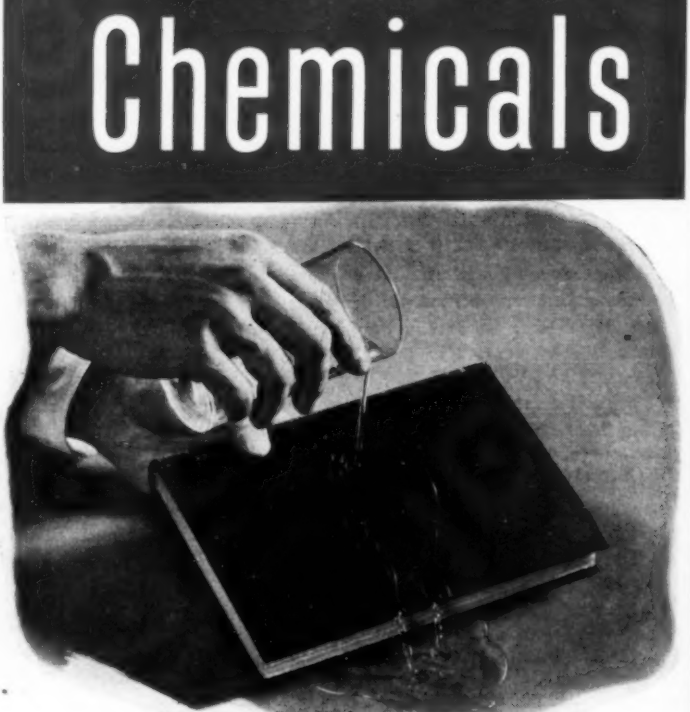
THE ENTHONE CO., 441 Elm Street, New Haven 2, Conn.

Metal Finishing Chemicals — *Electroplating Equipment*

ENTHONE

ACID ADDITION AGENT

Celanese® Chemicals



Water-repellency is only one quality Lindol contributes to emulsions used as plasticizers for coating papers and fabrics. Better dispersion of pigments, better color values—non-flammability—toughness and flexibility—are other advantages of these stable Lindol compounds.

CELANESE CORPORATION OF AMERICA

Precision and diversification typify research in synthetics

INDUSTRY, ever more concerned with advanced chemical processes, naturally turns to synthetics. For synthetics, by their very nature, can be more accurately tailored to individualized needs.

In exactly meeting these modern demands, Celanese research has produced precision results in widely diversified fields. For example, Celanese organic phosphate emulsions serve both in oil-in-water and water-in-oil processes to meet the demands of varied applications.

These stable compounds provide the key to many difficult situations. For instance, plasticizing water-soluble type plastics and water-soluble coating materials for paper and fabric, such as book and shade cloths. In addition to providing an improved plasticizer, these emulsions add the quality of water repellency—plus increased color value of pigments.

In common with the Lindol* group of organic phosphates, these emulsions also contribute high film strength and excellent lubricating characteristics. Consider their possibilities, too, as lubricants and coolants for wire drawing operations. They are non-corrosive, have high film strength lubricating characteristics, are fluxes for subsequent tinning operations and plasticizers for enamel coatings. This is the kind of *extra* performance which characterizes Celanese chemicals in the minds of engineers through such diversified products as Lindol, Lindol* E.P., Lindol* M.P., Celluflex* and Cellulube*.

Each is a specialized product, yet each has many specialized uses, often vital roles in industry and war. Lindol E.P., as a lubricant additive in oils for warplane engines, increases film strength to withstand long periods of terrific heat and acts to dissolve resinous deposits.

The point is that Celanese research isn't merely designed to serve everybody but to serve *you—your* needs. And not with *almost* what you want, but with precisely what you are looking for. What are *your* goals, present and near-future? Our Technical Staff would like to work with you. Celanese Chemical Corporation, a division of Celanese Corporation of America, 180 Madison Avenue, New York 16, N. Y.

PLASTICIZERS
ORGANIC PHOSPHATES
LUBRICANT ADDITIVES
INTERMEDIATES
DYE-STUFFS

*Reg. U. S. Pat. Off.

TEXTILES • PLASTICS • CHEMICALS

The Sterling 1000 quickly deburrs drilled, punched and stamped metal parts.

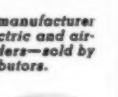
Shop men everywhere tell us that dozens of sanding jobs are now done in maintenance, heavy-duty production, and manufacturing in half the time with the Sterling 1000 Portable Electric Sander.

The Sterling 1000 performs equally well on wood, metal or plastics . . . sands undercoats, finished coats of paint, enamel, lacquer or varnish. Laps, polishes and rubs. Eliminates slow, tedious hand-sanding.

Designed for faster, cleaner sanding, the Sterling 1000 pays for itself in no time! See for yourself . . . ask your local distributor for a demonstration or write: STERLING TOOL PRODUCTS CO., 365 E. OHIO ST., CHICAGO 11, ILL.

Sterling is the only manufacturer of both portable electric and air-driven finishing sanders—sold by leading distributors.

STERLING 1000 PORTABLE ELECTRIC SANDER



TWENTY-FIRST YEAR OF PUBLICATION

Industrial FINISHING

W. H. ROHR, Editor E. A. DOSCH, Assoc. Editor

Vol. XXI, No. 5 MARCH, 1945 $2.00 a Year

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NEW:
Synthetic Enamels
Sanding Surfacers
Pearl Essence Coatings
Lacquer Enamels
WRINKLE FINISHES
For wood and metal

IMPROVED:
Vindolux
Wateroil Stains
Comb. Stain and Filler
DuBar Bleach
4500 LACQUER LINE
6400 SEALACQUER

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NON-INFLAMMABLE

« *wax free* REMOVER »

for paint, varnish, lacquer, baked enamel, adhesives

EASY TO APPLY—NO AFTER-CLEANING

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I. C. D. FORMULA 9 is the standard of safety and quality . . can be sprayed or brushed . . doesn't raise grain nor discolor . . quickly removes all kinds of finishes and coatings . . costs less to use . . saves time, labor and material.

SPECIALTY COATINGS—I. C. D. Labs. have specialized in the formulation and manufacture of non-inflammable coatings and substitute finishes. If you have a tough coating or finishing problem send in your specifications, finishing schedule and requirements. Immediate action and a prompt reply promised.

INDUSTRIAL CHEMICAL DEVELOPMENT CORP.

347 MADISON AVE. NEW YORK 17, N. Y.

Letters from Readers

Paint Drum Storage

We are greatly interested in the 2-deck paint storage drum rack illustrated on page 38 of your January issue. We are wondering if you could furnish us with a complete plan of this rack? We are especially interested in the loading and unloading device, as well as the percentage of slope in connection with the rack.—D-M Cabt. Co.

We are referring you to the builder of this equipment.—Ed.

Silk-Screen Stenciling

In your January 1945 issue, we note that you can furnish information about the silk-screen process of painting instrument dials, etc. If you have any of these reprints available, would you be so good as to let us have one?—W.M. Industries.

Would you please send us whatever data you can on silk-screen work? —G.W. Co.

In your recent issues we notice several requests for information on silk-screen process printing. We suggest that you refer the inquiries to us, as we maintain a Service Department that will be glad to answer any and all questions fully and promptly.—Naz-Dar Co., Chicago.

Rubbing Furniture Finishes

In the November issue of Industrial Finishing, on page 8, we note that you have supplied information to a concern inquiring about rubbing finishes on wood furniture. Would you be so good as to let us have information of this kind? We are manufacturing undersink kitchen cabinets and wall cabinets, and we wish to put a very nice finish on these items, and this information might be of help.

We also note, on page 6, that one of your subscribers asked for a reprint of the article "Tumble Finishing". Will you be so good as to let us have a copy of this article?—F.M. Co.

Request granted.—Ed.

Stenciled Sandblasting

Your reference to "Stenciled Sandblasting" in your January issue (page 118) is interesting. Can you tell us where we may obtain the rubber-covered steel stencils, or have them made to our designs? We are particularly interested in sandblasting glass, or rather mirrors, which we wish to combine with articles of solid walnut.—N.E. Co.

Information supplied.—Ed.

Bake Ovens; Dipping

Will you kindly furnish us with the address of the Industrial Oven Engineering Co., with reference to the article entitled "Three-Coat Finishing Setup", which appeared in your January 1945 issue?

We are also interested to learn if any of your readers have successfully used a machine dip system for cribs and infants' play yards.—T. F. Co.

Information furnished.—Ed.

Whirl-Coating Machine

In your November or December 1944 issue of Industrial Finishing, you carried advertisement of a paint spinner—a rotating machine that automatically picks up a paint film and dries it on small parts. We have misplaced our copies of these two issues and would appreciate it if you will send us the name and address of the manufacturer of this equipment. —A. D. Co.

See advertisement on page 129 of Feb. 1945 issue of this publication.

Finishing Dolls

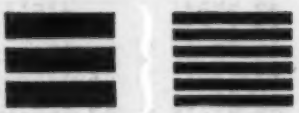
Do you have any information that you could give me pertaining to the finishing of dolls? If you included information about the finishing of dolls in any of your recent articles, or in any of your issues in the past, I would appreciate it very much if I could buy or borrow them.

If you did not have articles on

(Continued on page 10)

The new *High-solids lacquers* save money

High-solids lacquers mean thicker coats . . . therefore fewer coats. This saves you money—in the five ways shown, and perhaps others as well. You can estimate just how large your savings will be when you get the full facts from your own lacquer supplier. Ask him about the *new* high-solids lacquers he is developing.



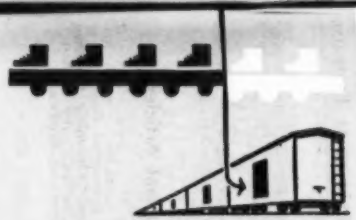
High-solids nitrocellulose lacquers deposit thicker films at spraying viscosity, give you the same finish with fewer coats.

Nitrocellulose lacquers are still the fastest-drying finish . . . in minutes at room temperature. No expensive baking equipment is needed.

the fastest-drying finish . . . in minutes at room temperature. No expensive baking equipment is needed.

You save assembly time with high-solids lacquers. Each finishing operation on assembly line and on feeder lines is speeded up.

One of lacquer's biggest advantages is the ease with which any scratches or imperfections in the finish can be retouched or repaired.



You save on your investment in goods-in-process when you finish in fewer coats. You also save factory space.

High-solids lacquers provide a lifetime finish on metal, fabric, leather, rubber, paper, or glass.

HERCULES

HERCULES POWDER COMPANY
INCORPORATED

928 Market Street, Wilmington 99, Delaware

CL-51A

ASK YOUR LACQUER SUPPLIER

for details. Hercules makes no lacquers . . . concentrates on production of highest-quality nitrocellulose and its applications.

MSA FEND-A
BARRIER
SKIN PROTECTION

Rubbed-in on clean skin before work, this vanishing-type FEND cream protects against dirt, paint, enamels, lacquers, inks, oxides, grease and other irritants—is easily removed with soap and water at work's end. Send for complete FEND facts, in 20-page descriptive Brochure!

MINE SAFETY APPLIANCES CO.
Braddock, Thomas and Meade Streets
PITTSBURGH 8, PA.

Leakproof Air Blow Gun

Use this gun for blowing dust, dirt or lint from the surfaces of parts and products to be coated with paint or any other kind of coating. It will improve your finish tremendously.

Also useful for blowing out moisture or other entrapped liquid from crevices, seams or indentations in parts to be cleaned or painted.

Fits comfortably in the palm of hand. Has button control air valve. Special composition washers prevent leakage. We can furnish any type nozzles—round, pointed, flat or 10-in. extension. Nozzles are interchangeable and renewable. Every plant should have one or more. Write us!

G. M. MANUFACTURING CO.
Engineers, Mfrs. of Complete Spray Equipment
216 N. Clinton St. Chicago, Ill.

this subject, is there anywhere you could refer me for this information? Your assistance will be appreciated because I need this data.—C. W.

Can some reader offer any information on this subject?—ED.

Important Articles

Please send us a copy of each of the following articles: "Some New Techniques in Protective Coatings", by Carl Bauer; and "Finishing Aluminum With Paint Coatings", by Robert I. Wray.—K. CHEMICAL WORKS.

Request granted.—ED.

Moves and Tilts Drum

On page 88 of January 1945 issue of INDUSTRIAL FINISHING you have an article entitled, "Moves and Tilts Filled Drums." We will appreciate your letting us have the name and address of the manufacturer of the device in question.—P.&L.Co.

The handling of heavy drums which contain linseed oil, turpentine and other bulky products has caused us considerable worry. We have heard of an individual drum rack on wheels which can be rolled to the receiving entrance, drum placed thereon, and then returned to proper place in storeroom. Do you know of anything of this nature? At present we have across our room, a large permanent rack upon which these drums must be placed, and it involves a lot of heavy work. If you know of any such article as we are seeking, would appreciate some word of same.—J.A.F.

We noted in your January 1945 issue, an article appearing on page 81 regarding a truck to handle filled drums. Could you advise the name of the manufacturer?—C. C. Co.

Information given.—ED.

Masking Table Tops

We have the following problem: On the manufacturing of card tables, folding type, we use a top made of cardboard with a lithograph. This top must be assembled before finishing the folding legs of the card table and the wood frame which is around the top. When finishing the frame and legs of the tables we can not avoid some of the stain and varnish getting over onto the lithographed top. We would like for you to recommend some firm that can sell us a masking compound, masking paper or paint with

PERFECTION FLAT FINISH
TRANSPARENT AS *Clear Glass*

REVEALS FULL BEAUTY
NO CONCEALMENT—NO DISTORTION

● Notice how the glass covered with conventional flat finish (gloss varnish with stearates or other foreign flattening agents) masks and distorts the beautiful girl in the picture. This same degree of concealment and distortion occurs when ordinary flat finishes are applied to furniture surfaces.

What a difference when Perfection Flat Finish is applied! A unique product of synthetic chemistry—perfectly clear, free of distortion—Perfection Flat Finish brings out the utmost beauty of wood grain and stain.

Waterproof, liquor-proof—free from orange peel—durable and economical—Perfection is best by every test. Let Perfection Flat Finish prove its outstanding superiority—right in your own plant. Perfection Flat Finishes are available in a full range of long-lasting sheens.

PERFECTION
PAINT & COLOR COMPANY
Indianapolis, Indiana

Get RUST off your payroll!

No need for rust to cost you money. Science has found a new way to stop its needless waste. TECTYL gives you tested, proven, *positive* protection against rust or corrosion. Easy to apply and remove, economical to use—one of the five specialized Tectyl types will solve your special problem. Write today, indicating your corrosion-prevention needs, and we will send Tectyl bulletin with complete application data.

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STOPS RUST
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456 Culvert St. Cincinnati 2, Ohio
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New York-Atlanta-Detroit-Chicago
Los Angeles-Vancouver
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MIRACLE
5 Gallon BLUE BOY Model
PAINT REJUVENATOR

Restores Paints, Lacquers, Enamel Products and Pigment Primers, to original consistency in 3 to 10 minutes without opening the can. Available for Round or Square 5-gallon cans. Explosion-proof electrical equipment if desired. Also other units from ¼-pint to 50-gallon drum capacity available. Originators of Paint Rejuvenating equipment — ten years — thousands of satisfied users.

Miracle Paint Rejuvenator Co.
127 E. 9TH STREET ST. PAUL, MINN.

which we can temporarily cover the tops without damaging them, while we finish the remainder of the table.

We would like to know if there is some kind of paper, compound or paint with which we can cover the lithograph, then finish the table and wash off the compound, paint or paper that protects the lithograph. We would like to wash this paint or paper or whatever you recommend with water and in this way, if some of the stain or varnish (which goes on the frame and legs of the tables) gets over onto the top, this will not be damaged.—"LA MALINCHE," Mexico.

In a letter, we are submitting the names and addresses of several concerns that can supply masking tape or masking compound for your work. —ED.

Flow-Coating Nozzle

Will you kindly send us a copy of the December issue of INDUSTRIAL FINISHING, or a copy of the article concerning a new type of nozzle for use in paint flow coatings?—HERCULES.

Tear sheet sent.—ED.

Graining Flat Sheets

In your May 1944 issue of INDUSTRIAL FINISHING, on page 68, you had an article entitled, "Finishing Fibreboard Panels" by E. C. Eldon. Can you give me the names of manufacturers of equipment for the different methods of graining?—M.C.

We are confronted with the problem of "graining" sheet metal parts to imitate wood. The method now used is the conventional etched plate and ink roller. This is very slow and costly. Do you have any reprints of articles on this process that may be of interest in designing a new and quicker method.

Recently, I read an article covering a process wherein an actual piece of wood was used as the master plate. The wood was treated somehow so that it was unnecessary to use a zinc or copper etching. Unfortunately I have lost track of this article. Perhaps you may recall such a manuscript.—C. MFG. CO.

The use of an etched copper plate and ink roller is generally recognized as one of the best methods of doing this work. To use an actual piece of prepared wood as the master plate involves practically the same process, only the wood will not last as long as an etched copper plate. In either case the plate is inked, surplus ink is scraped off with a squeegee, a large

(Continued on page 104)

STILLE-YOUNG

★ LABORATORY ANALYSIS
★ PRACTICAL EXPERIENCE
★ TRAINED SERVICE REPRESENTATIVES

Can be of help to you in solving finishing problems whether of production or maintenance.

Lacquers Fillers Stains

Enamels Paints

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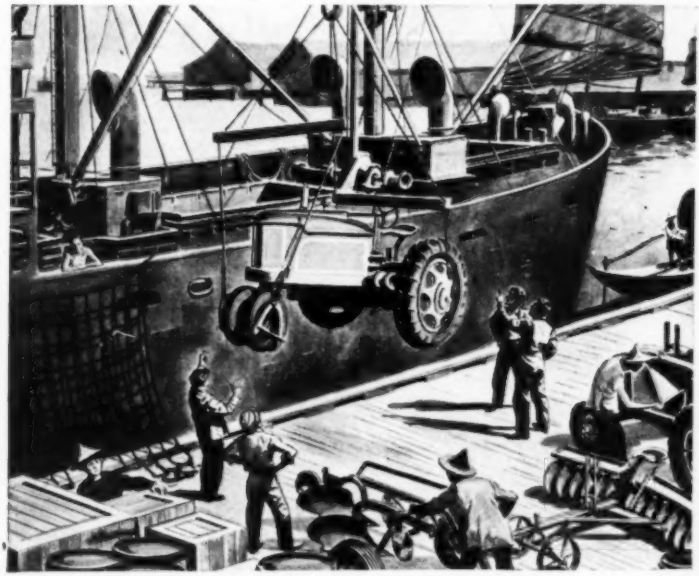
2300 North Ashland Avenue • Chicago 14, Illinois

Do you know...?

Quiz on timely production short-cuts—No. 13

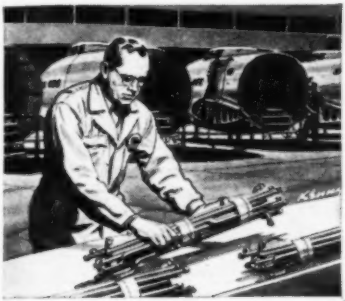


Q. Experts estimate our postwar foreign trade volume at:

☐ $2,000,000,000 ☐ $7,000,000,000 ☐ $12,000,000,000

A. With devastated countries to be rebuilt, and new world markets opened up, postwar foreign trade may become a twelve-billion-dollar business within a few years. One of the most important sources of this income will be machinery and parts of various kinds shipped overseas—and, in this respect, Permacel moisture-proof cloth tape (Utilitape) will play a vital role. Wartime experience in packaging planes and tanks for overseas shipment proves that this tape is an ideal moisture-sealer for openings and vents. Protects metals of all kinds against corrosion, helps eliminate the need for reconditioning plants abroad, assures arrival of materials in perfect condition.

Permacel Industrial Tapes



Q. How many feet of tubing in a B-29?

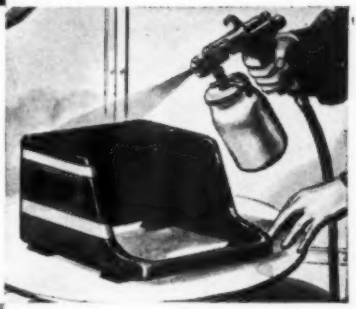
☐ 1,000 ☐ 5,000 ☐ 2 miles

A. Two miles. In assembling sections of tubing and pipe lines, production is speeded and costs are cut by bundling sections with Permacel cloth tape (Jonflex). Thus, inventories can be maintained in terms of complete unit assemblies, no parts are lost, no time is wasted searching through separate bins.

Q. What's the world speed record for typing?

☐ 104 words per minute
☐ 149 words ☐ 172 words

A. The record, set in 1940, is 149 words per minute; the average secretary types about 50. On postwar typewriters, scientifically planned finishes—applied with spray gun and Permacel paper masking tape—will help cut glare and fatigue, increase accuracy and speed.



Q. The title of this booklet refers to:

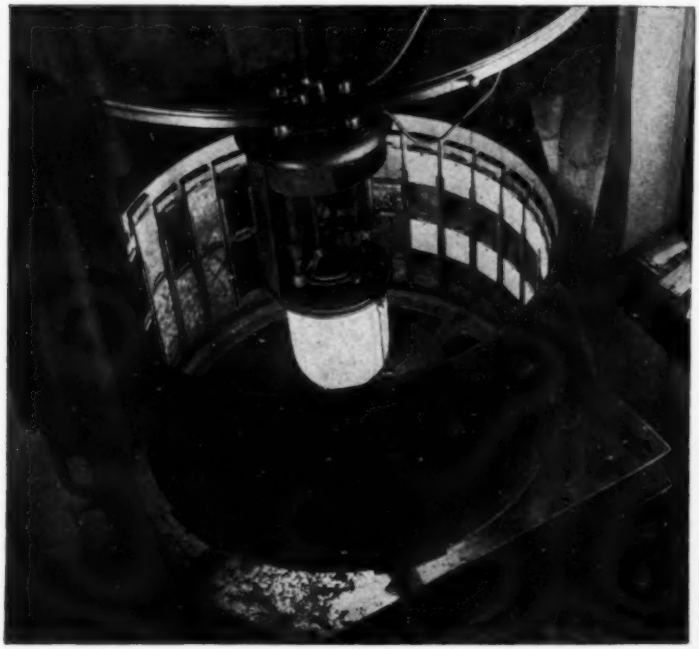
☐ Electricity ☐ Tape
☐ New-type wrench

A. Pressure-sensitive tape. This free booklet shows how Permacel Industrial Tapes speed production and cut costs all along the production line. Illustrates and lists many applications that may be helpful in your business during conversion and after. Write for *your* free copy today: Dept. IF-13, Industrial Tape Corp., New Brunswick, N. J.

IMPORTANT: ***Our research laboratories are at your disposal for development of special tapes to meet war and postwar needs.***

INDUSTRIAL TAPE CORPORATION
NEW BRUNSWICK, N. J. MAKERS OF Texcel Tape
"PERMACEL" REG. U. S. PAT. OFF.

Sunshine 24 hours a day



"WEATHEROMETER" Tests Permanency of Pigments!

WITH this instrument, Pittsburgh technicians subject paint film to the same kind of ultra-violet rays which are given off by the sun. Under this powerful lamp the effect of some types of climate and weather conditions can be produced within a few hours which would require months or years to duplicate through actual exposure. Should the color permanency of a pigment shipment be questioned, samples of it are made into batches of paint. These are quickly and thoroughly checked in the "Weatherometer" before the pigment is released for manufacturing use.

to make colors last!...

Just Another Example of Pittsburgh's Ceaseless Vigilance to Make the Best Industrial Finishes That Your Money Can Buy!

PITTSBURGH'S Industrial Finishes are as good as human foresight and ingenuity, painstaking craftsmanship and vast resources can make them.

They are made to highly scientific formulas by modern methods and machinery. They are constantly being subjected to rigid tests and inspections.

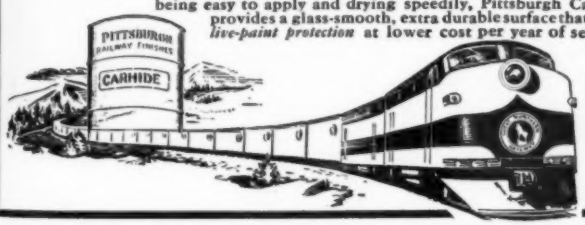
For this purpose, Pittsburgh maintains a thoroughly equipped and competently manned Analytical and Testing Laboratory.

Every ingredient which goes into Pittsburgh Paints and Varnishes is meticulously analyzed and tested before it can be used. After manufacture, all finishes are subjected to the most severe tests—far more punishing than they would receive in actual use—to make certain that they render the service expected of them.

By such ceaseless vigilance in every step of the manufacturing process, the purchaser or user of Pittsburgh Paints is assured that he is getting *the very best his money can buy!*

Great Northern Railroad Chooses Pittsburgh CARHIDE in Colors!

Freight cars of the Great Northern are painted completely in 24-hour cycles, ready for stenciling after over-night drying. Besides being easy to apply and drying speedily, Pittsburgh Carhide provides a glass-smooth, extra durable surface that gives *live-paint protection* at lower cost per year of service.



PITTSBURGH PLATE GLASS COMPANY, Industrial Paint Division, Pittsburgh, Pa. Factories: Milwaukee, Wis.; Newark, N. J.; Houston, Texas; Los Angeles, Calif.; Portland, Ore. Ditzler Color Division, Detroit, Mich. The Thresher Varnish Co., Dayton, O.

PITTSBURGH *Industrial* **FINISHES**

PITTSBURGH STANDS FOR QUALITY PAINT AND GLASS

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An interesting and colorful booklet on their product has been prepared for your information and convenience by the makers of Cellusuede Cotton and Rayon Flock. Brief, clear explanations give all the facts you'll want to know about this versatile coating material; what it is made of; how it is applied; how it can be used. In the pages of this booklet you may find the answer to one of your manufacturing problems. You will be interested, too, in the colorful and unique application of Cellusuede on the booklet cover. Write for your copy.

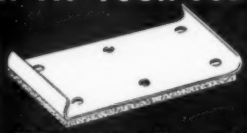
Color Card, Samples, Prices Free On Request

CP Cellusuede Products, Inc.
ROCKFORD, ILLINOIS

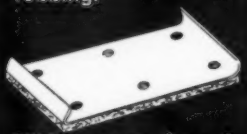
UP PRODUCTION!

. . . USE SANDING PADS THAT FIT YOUR JOB

Yes, it's "EASY" SANDING



FELT—wet sanding and rubbing.



RUBBER—general sanding, rubbing, polishing, deburring.

SPONGE RUBBER for curved surfaces.

For working concave surfaces.

THE EASY SANDER detachable bottom plate provides a simple, instant, snap-action method for attaching the type sanding pad to fit the job. Sanding pads of correct type assure *maximum efficiency* on flat or curved surfaces, wet or dry work. Write for details.

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To make sure that vital war material is not held up for any reason, the government has had contractors who do spray painting install Water Wash Booths. The benefits gained include minimum fire hazard; greater protection for workers; elimination of cleaning ducts and flues, thus releasing workers for more productive jobs. Learn all the advantages Paasche Water Wash Booths offer *you*.

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The Solution to your Wrinkle Finish Problem

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A SUPER WRINKLE ENAMEL FOR PRODUCT FINISHING

- **Contains No Alkyd Resins**
- **Available Without Priorities**

TOUGH - DURABLE - ANY TEXTURE
Adaptable to Any Production Schedule

NOTE: Non-Alkyd Black No. F4264 and Non-Alkyd Olive Drab No. F-4273 have the acceptance of the Army Service Forces under the TAC-ES-680b Specifications.

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PEORIA & VAN BUREN STS.
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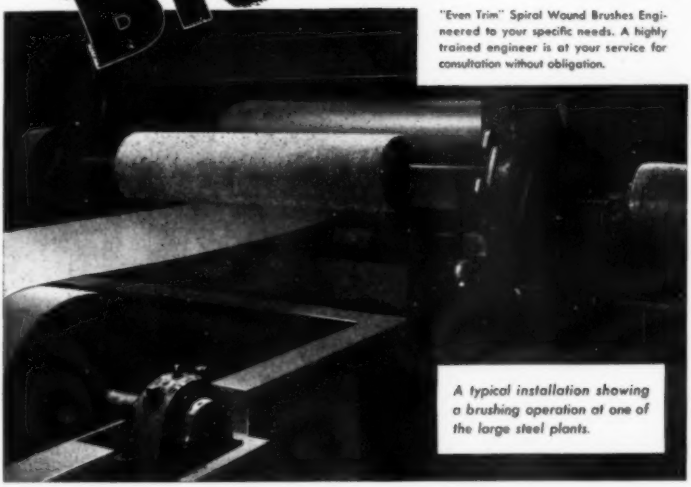

A typical installation showing a brushing operation at one of the large steel plants.

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Carefully controlled distribution of the brushing stock gives perfect balance and maximum efficiency to these power driven rotary brushes. Wire or fiber. May be used as individual sections or in assemblies.

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These scratch brushes are uniformly filled. They are trimmed with a "bite" to give the best performance obtainable with hand scratch brushes.

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★ Flexibility so designed to make it suitable for collapsible aluminum tubes, and other metal containers.

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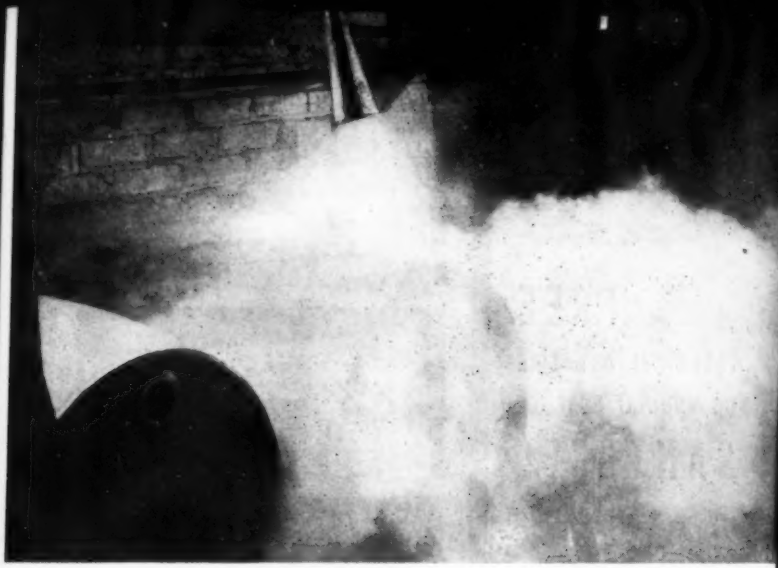


Built-in carbon dioxide fire-extinguishing systems protect industrial plants and storage warehouses from fire. Set off by heat actuators, located under the ceiling which operate when hot air from fire rises, the carbon dioxide gas is automatically released from cylinders where it is stored under high pressure. The force of its own expansion drives it through piping and out of shielded nozzles at scene of fire. (Photographs, Walter Kidde & Co.)

Automatic Control of

OPERATIONS involving the storage and use of paints, lacquers, varnishes and solvents are a notorious fire hazard, and yet disastrous fires which could easily have been prevented or controlled continue to destroy properties which, in these critical days, are particularly important to all of us. For example, a fire originating in an oven for drying freshly painted metal parts spread to a dip tank and resulted in damage of $250,000 to a building and its contents in New York City.

Many fires occur in factories that use various kinds of paints, solvents and similar materials; and most if not all of them could be prevented or extinguished in their incipience by proper understanding of the hazards involved and intelligent provision for their control.

The basic factors underlying prevention and control of industrial fires, and particularly those arising in flammable liquids, resolve themselves into the following categories:

A) Good housekeeping.

B) Provision of appropriate first-aid fire extinguishers, and regular training of personnel.

C) Installation of local-application fire-extinguishing units for special hazards; and

D) Over-all, or "total-flooding" automatic extinguishing systems.

Dip-tank operation protected by a local-application carbon dioxide fire-extinguishing unit. Heat-detector on overhead plate automatically releases carbon dioxide an instant after fire occurs. Strategically placed discharge nozzles will direct blanket of fire-killing gas to drain-board, dip tank and coated parts simultaneously. The gas will not damage parts or other materials, and any paint remaining in the tank can be used.

Paint Fire Hazards

BY P. W. EBERHARDT
Manager Industrial Department
Walter Kidde & Co., Inc.

Regular and Thorough Clean-up in All Painting Rooms

Good-housekeeping should be observed at all times in any well-managed plant, and above all in those whose processes are especially hazardous from a fire-prevention point of view, but it is only necessary to read the records of industrial fires to have the fact driven home that this is not the case. A boat works at Midland, Ontario, engaged in making war vessels for the Royal Canadian Navy, was reduced to a flat expanse of smoking embers when, according to the report of the N.F.P.A., fire broke out in "a small shack filled with shavings and other bombustibles" which served as the boiler room.

The presence of shavings, sawdust, empty paint buckets, oily rags, etc. is indefensible in any well-run plant. Fibrous or other freely divided materials which have come into contact with drying or oxidizing oils, will heat spontaneously because of the rapid oxidation of the thin films of oil spread out over the surface of the fibers. Fires from the spontaneous

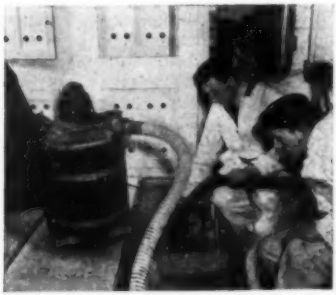
ignition of cotton waste or rags that have been used for wiping up linseed oil or other thinners or solvents are frequent.

Clean Housekeeping in Important Boat Factory

An example of excellent good housekeeping, which has permitted the uninterrupted production of PT boats for the U. S. Navy, is found in the Elco Boatyard at Bayonne, N. J., where a carefully planned system of fire-protection is followed through. Here a boat-cleaners' dept. vacuums up any mess as soon as it is made, every day in the week. No sawdust, shavings or empty paint buckets are allowed to lie around even temporarily.

Every foot of the plant is continually inspected by sharp-eyed watchmen who have learned that lunch hours are real danger periods. Bags and papers from the employees' lunches constitute a removable hazard, and are picked up regularly after lunch hour by men specially charged with that responsibility.

In this plant the painters' locker is fireproof, and open-grille lockers are provided to allow paint fumes to dissipate before they become dangerous. A ridge between the locker and its door offers a barrier against even so improbable a contingency as the flowing out of flaming liquids. Clean coveralls are supplied to the painters twice a week, and the soiled ones must be placed in a special coop in the open air. These evidences of good-housekeeping exemplify one of the primary principles of fire control, which is to *deal with the hazard rather with the fire.*



This clean-up team uses a big vacuum cleaning outfit to pick up chips, dust, shavings, etc., in the plant, all of which reduces possible fire hazard.

First-Aid Extinguishers Must Be Suitable for Hazards You Have

The importance of providing appropriate first-aid fire extinguishers would seem to go without saying, but the fact is that this obvious requirement is often neglected. In some instances, as in the case of the Canadian boat works' fire, no first-aid fire appliances were available, according to the official report, and it was further stated that had such equipment been at hand, employees could easily have extinguished the fire when it was discovered.

A large number of plants do provide portable extinguishers, but frequently pay little attention to the question of their suitability to existing conditions. The familiar soda-acid type of extinguisher will do yeoman's service when some careless smoker tosses his cigarette into a pile of excelsior, but is not intended to cope with fires in paint or other inflammable liquids, and it will fail when put to tasks beyond its scope.

Carbon dioxide, foam, carbon tetrachloride or dry chemical extinguishers are approved for use on fires involving small quantities of flammable liquids, and they must be requisite size and number

To Properly Clean and Condition For Durable Paint Finish Use

DEOXIDINE

Official U. S. Signal Corps Photo

The new Superbazooka fires a 38-pound 4.5 inch rocket having the destructive effect of a 105 mm. high explosive artillery shell. Launcher and rocket can be carried by one man.

Much Army ordnance and equipment of steel are simultaneously cleaned and conditioned with 210 DEOXIDINE before receiving the protective paint finish.

210 DEOXIDINE was developed by the American Chemical Paint Company to do, and do better, many cleaning operations for which alkalies have been used. In spite of the fact that **210** Deoxidine is acidic, it removes most oils and soil quickly, effectively and economically and when properly rinsed leaves the clean metal free from those paint-removing, bond-destroying residues that impair the life and protection of paint coats.

210 DEOXIDINE meets Army Specifications — AXS 1245 — for cleaning and conditioning for finish when used as directed in ACP Technical Service Data Sheets No. 3-2-210-2 and No. 3-2-210-4.

The American Chemical Paint Co. Technical Department will gladly consult with you and advise regarding proper chemicals to use in metal cleaning both for war products and those for civilian use — address Dept. B-3.

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AMERICAN CHEMICAL PAINT CO.

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— West Coast Plants may address inquiries and orders for prompt delivery to Leon Finch, Ltd., 728 East 50th St., Los Angeles, California

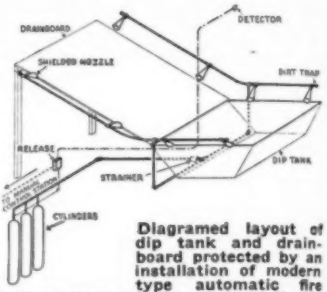
to control the particular hazards they guard. The Crosby-Fiske-Forster Handbook of Fire Prevention, in the section devoted to this subject, says "For large-scale protection, properly designed carbon dioxide systems of suitable size are necessary."

Fire-Control Engineering; Dip Tanks; Spray Booths

This brings us to the third catagory of basic requirements for good fire-control engineering—local-application fire-extinguishing units for special hazards, such as dip-tanks and spray booths. Many aspects contribute to making these operations especially hazardous from the safety engineer's point of view.

Finishing materials such as paints, varnishes, lacquers, enamels, etc., contain flammable solvents which will ignite at low temperatures. Explosive or flammable vapors are formed when such liquids are exposed to evaporation, as in spraying. And the large volume and concentration of work carried on in spray booths, with the formation of such vapors and the deposition of highly flammable residues, necessitates the greatest care in the construction and maintenance of these units.

Spray booths must be of non-combustible construction, with a separate exhaust duct for each booth. There must be complete ventilation to dispose of vapors and waste residue; special vapor-proof electrical equipment must be provided, exhaust fans of the non-sparkling variety should be located outside the booth, and the booths and their ducts should have frequent and thorough cleaning. Scraping should be done only with brass or other non-sparking scrapers, as steel tools may cause



Diagramed layout of dip tank and drainboard protected by an installation of modern type automatic fire extinguishers of the carbon dioxide type. Carbon dioxide, highly compressed, is stored in three cylinders. Overhead detector is centered above the fire hazard area. Heat under the detector causes the carbon dioxide to be released through nozzles positioned to direct the fire-smothering gas over the flaming tank and drainboard.

sparks. All scrapings and sweepings should be placed in metal receptacles and promptly removed from the premises. Portable extension lights should not be used.

This careful attention to the hazards existing in spray booths should be supplemented by a built-in, automatic fire extinguishing system. The local-application high-pressure unit, which extinguishes fire by releasing carbon dioxide gas directly toward the surface protected, is primarily applicable to the protection of flammable liquids in open containers, spray booths, dip tanks, or similar hazards. This is a machine gun type of fire-fighting aimed at the heart of the danger spot. It provides protection to those processes in a plant which present a constant threat to safety, especially those which are located in a section of a busy factory where a blaze offers immediate danger to workers or to installations placed in the immediate vicinity.

Careful planning of a local-application installation extends to all

(Continued on page 37)

THIS "Long Tom" shell is ready for action. Its protective paint coat INTACT. Mute evidence that it has successfully resisted attack by corrosion.

Over 49% of the prime contractors making 155 mm "Long Tom" shells use specialized Oakite materials for cleaning, surface conditioning, rust removal or related operations. They have discovered that because of the dependability of Oakite materials and the proved capability of Oakite techniques . . . paint coats will grip surfaces . . . will adhere tenaciously to protect shells until ready for action.

Our Technical Service Representative is freely available at all times for consultation wherever cleaning and related operations on war supply items are concerned. His personal help and advice involve no obligation.

OAKITE PRODUCTS, INC., 32F Thames Street, NEW YORK 6, N. Y.

Technical Service Representatives in All Principal Cities of the United States and Canada

OAKITE MATERIALS...METHODS...SERVICE — Buy Bonds for Victory — **CLEANING** FOR EVERY CLEANING REQUIREMENT

HOW A RUBBER COMPANY IS *Stretching*

Painting shells inside and out at the rate of one every second

Painting fuse bodies an identifying color at a speed of 154 a minute

g Shell Production

TO THE LIMIT!

.with DeVilbiss Automatic Spray Machines

TO meet the call from fighting fronts for more ammunition, the United States Rubber Company has a fast answer. It's their high-geared setup for producing 40 mm. anti-aircraft shells —a part of which are DeVilbiss Automatic Spray Machines that paint shells and fuse bodies with lightning-like speed.

The illustration, upper left, shows a DeVilbiss two-gun automatic spray system that paints the shells—first outside, then inside—at the rate of one a second. The lower view shows another DeVilbiss dual-gun spray station that paints fuse bodies an all-over white; then, after collars are put on, the tips are painted an identifying green—at the rate of 154 a minute. All spraying is done in DeVilbiss Water-Wash Exhaust Booths.

Many DeVilbiss Automatic Machines like these are helping to fill vital war needs now. And in addition, they are giving many manufacturers a clue to faster, more economical finishing and coating methods for their peacetime production after Victory.

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Canadian Plant: WINDSOR, ONTARIO

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Spray Systems
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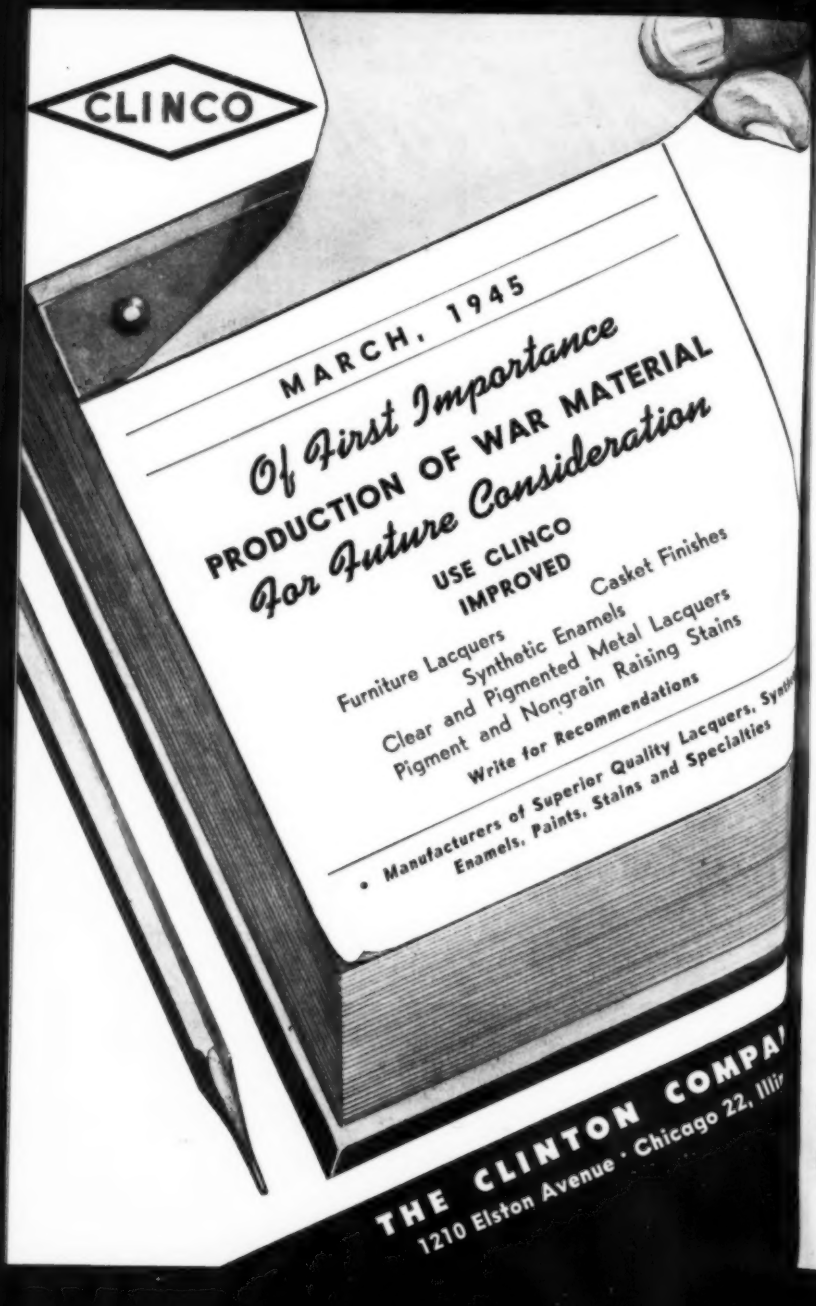
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flammable material likely to be involved, in order to avoid the danger of a reflash. Placement of discharge nozzles should include the outside of a tank where drippings can accumulate, and also any point to which fire might spread.

Extreme care should always be taken in the placement of nozzles; in the case of dip tanks, they are ordinarily aimed horizontally so as to shoot a gentle barrage across the surface of the liquid without agitating it, whereas over drainboards they are mounted so as to discharge in a downward direction. If parts are suspended above the drainboard, they should also be enveloped by the released gas.

Careful attention should be paid to the necessity of screening the shielded nozzles to prevent accumulations of lacquer or other particles which might clog them and prevent their operating in an emergency.

Merits of Carbon Dioxide as Fire-Extinguishing Agent

One of the great merits of carbon dioxide as an extinguishing agent lies in the fact that since the gas is chemically inert, it does not react with anything it touches, consequently there is no problem of reclamation. There is no mess, nothing to mop up, no odor, and supplies are not contaminated.

Several hazards may be simultaneously protected from a centrally located system through the use of directional valves whose actuation may be automatic or manual, as desired. In the automatic system, the heat detectors direct the discharge to the particular place afire. The directional valves permit any required number of cylinders (containing supply of compressed carbon dioxide) to be "picked off" from the entire bank, to cover any designated space. When the system is manually operated, it is only necessary to turn the directional valve for whichever space is in distress and then release the cylinders.

Total-Flooding Systems for Room Protection

Some plants handling flammable materials employ both the local application units just described, and also a total-flooding system by which the entire room or building may be flooded with carbon dioxide. An example of such installations is found at the Holley Carburetor plant in Detroit, Mich., where gasoline is used to test carburetors before they are shipped out.

The testing chambers are individually protected by local-application units, while the whole test room is included in a separate extinguishing system. In the case of the latter, a time-delay of approximately half a minute from the sounding of a siren to the discharge of the gas is employed to enable personnel to leave the premises. While the gas is nontoxic, it extinguishes fire by speedily cutting down the oxygen supply to a point at which fire combustion cannot be maintained, and this is insufficient oxygen for breathing.

The gas can be made to do more than fight fire directly. In the high pressure systems just described, it is possible to use it simultaneously to close windows and doors, throw a screen of gas across openings, shut off motors and close ventilating louvers, all serving to isolate the blaze and keep it from spreading. This combination constitutes the utmost in engineered fire protection, and has saved many a vital plant.

Carbon dioxide does not freeze, or corrode its piping. The type

of carbon dioxide systems described here require little space in which to keep the storage cylinders, as the gas is compressed into liquefied form at 1/450th its gaseous volume. As the expansion of the gas upon release suffices to drive it through the pipes and out of the discharge nozzles, no extraneous force is needed. No special storage rooms need be provided, and no pumps or refrigerating units are required. The carbon dioxide does not deteriorate, and recharging of the supply is necessary only when 10% or more by weights has been discharged.

When all plants employing such materials as paints, lacquers, varnishes, solvents and thinners in their processes, come to insuring themselves against fire itself, instead of being content to insure only against capital financial loss, a new record of efficient production may well be achieved.

Taping Protects Tanks During Shipment

THE TANK, partly illustrated here, is being prepared for overseas shipment. Cracks, crevices, and holes are sealed with Utilitape, an olive drab adhesive tape familiar as the protective cover for much war equipment that has been shipped overseas.

In this motorized war, thousands of vehicles are shipped daily, mostly as deck cargo. All must be ready for action on arrival. Utilitape covers, adheres to and protects every opening. Delicate mechanisms can't be harmed by moisture, dirt or debris.

The tape is made of Revolite fabric into which a Bakelite special flexible phenolic resin is forced. It's waterproof, dirtproof, acidproof, and air-resistant. With the addition of a strong adhesive agent produced by the Industrial Tape Corp., Revolite fabric becomes Utilitape, a sealing agent of high tensile and adhesive strengh—protecting the tanks and planes today; the export shipments tomorrow.

Taping certain areas of a battle tank for overseas shipment. Photograph, courtesy of Industrial Tape Corp.

Makes Cleaning Compounds

Production is under way in the Homestead Valve Mfg. Co.'s new cleaning-compound manufacturing plant at Edgeworth, Pa., across the Ohio River from the company's main plant in the hills near Coraopolis.

F. E. Schuchman, General Manager of the Company, states that the new plant will supply industry and all branches of the armed forces with compounds for Hypressure Jennys and other steam spray cleaning machines, to restore machinery, tanks, planes, trucks, bull-dozers, and other war material to "fighting-trim", eight to ten times faster than by hand-cleaning methods. The plant will also make compounds for use with "dip-tank", "soaker-tank", and other methods of cleaning in essential industries.

● No matter what your product, Old Man Corrosion is bound to attack it as soon as it goes into use. But the Old Man himself admits that Permite-protected surfaces give him his toughest fight. For Permite Ready-Mixed Aluminum Paints preserve your product with layer after layer of over-lapping aluminum flakes. Every surface is metal-clad against destructive forces.

Although the different types of Permite Aluminum Paints are still limited, the full line will become available as wartime restrictions relax.

We also offer a complete line of Permite Industrial Finishes formulated to government specifications. Quotations submitted promptly upon request.

ALUMINUM INDUSTRIES, Inc., Cincinnati 25, Ohio

The Permite Line of Industrial Finishes includes Synthetic Enamels, Lacquers, Lacquer Enamels, Varnishes—also Government Specification Finishes.

PERMITE READY MIXED ALUMINUM PAINTS

A Film is Born

BY PAUL O. BLACKMORE

Director, Products Engineering & Development Laboratory
Ault & Wiborg Division of the Interchemical Corporation

(Part III — Polymerization)

BILL stood at the exit end of the big oven and watched a gleaming white refrigerator shell emerge from within. As it approached him, he reached out and touched its glistening surface. It was hot. Very hot. But in spite of its elevated temperature it was hard, non-tacky, and dazzlingly white. Bill knew, also, that it was very tough and durable. He knew that it would be well able to withstand the numerous changes of temperature to which it would be subjected during its life. He knew that humid atmospheres, heat, cold, greases, alkalies, acids, and all of the usual household deteriorants would never harm its pristine beauty.

"They look wonderful," he thought proudly as the boxes passed on down the line to receive the various other operations that would convert them into completed refrigerators.

Bill had a right to feel proud. He was foreman finisher in this big refrigerator factory, and it was his job to see that they kept on looking wonderful. His thoughts were interrupted by a voice.

"Bill," someone said, "you look as if you had just seen a miracle."

Bill glanced around to see the technical representative of his paint supplier approaching.

"Hello, Jack," he said as they shook hands. "I *have* seen a miracle. I see one every time one of those gorgeous things comes out of the oven."

Jack laughed. "I'm glad you like them," he said, "but what's so miraculous about them?"

"Jack," Bill replied, pointing to one of the boxes, "15 minutes ago that finish was a liquid mist coming through the tip of a spray gun, and look at it now. It's hard, glossy, gleaming white, and so tough that you couldn't get it off with a stick of dynamite. I never cease to be amazed that such a tremendous transformation can take place in such a very short time."

"That's nothing," said Jack, "we *have* cured finishes like that in the laboratory in as little as six seconds. It's hardly a practical thing to do, but it serves to demonstrate that polymerization is a function of both time and tem-

Final installment of a 3-part article wherein Mr. Blackmore explains, in non-technical language, something that every one of us should know about paints, lacquers and varnishes, namely, what makes the spread-on films dry. Drying by evaporation was explained in the first part; next came drying by oxidation; now we have the last of the series, drying by polymerization.

A Chemifinish for Copper Alloys

Last month the new Du-Lite Chemifinish for Copper Alloys was announced. The tremendous response indicates that Du-Lite has developed a much needed finish which will be widely used by industry.

Have you any brass or bronze parts which are difficult or impossible to blacken without plating? Send us a few samples of the parts and we will oxidize them by means of our new process. They will be returned for your inspection with details of processing procedure. We guarantee that you can duplicate the finish in your plant in regular production.

Perhaps the life of the copper oxidizing bath you are now using is too short. Du-Lite can help with this problem, too.

The new Du-Lite Fact Book should be in your file for reference. Ask for a copy.

DU-LITE CHEMICAL CORP.
MIDDLETOWN, CONNECTICUT

perature, and the higher the temperature, the shorter the time."

What Is Polymerization?

"What is this 'polymerization' you're always talking about?" asked Bill.

"Polymerization," replied Jack, "is the magic wand that performs your daily miracle. If you'd really like to know something about it, let's go back to your office and I'll try to explain."

Jack began arranging paper clips on Bill's desk to explain the chemistry of drying by polymerization.

Seated in Bill's office, puffing on a cigarette, Jack told this story.

"Organic chemistry," he began, "is a pretty complicated subject. It is defined as the chemistry of the compounds of carbon. Carbon itself is one of the chemical elements. It is a 'tetra-valent' element which means that it has four chemical bonds, or places of affinity, where other elements can attach themselves. Thus, carbon can react with four mono-valent atoms such as hydrogen or chlorine, and when it does, we have methane, (Fig. II) or carbon tetrachloride .

"It can also react with two di-valent atoms such as oxygen and we have carbon dioxide, O=C=O.

"The simplest organic compounds contain carbon, hydrogen, and oxygen, but they may also contain nitrogen, sulphur, chlorine, bromine, iodine, and many others. They can, and do, get extremely complicated. By the way, Bill, what kind of paper clips do you have?"

"All kinds," replied Bill. "Big ones, little ones, round ones, rectangular ones. Take your pick."

"Fine," said Jack. "Give me some of all of them. They will help to make my story more clear."

Jack started to arrange the paper clips on Bill's blotter pad as he talked.

Your Glossy White, Durable Refrigerator Finish

"Your refrigerator finish," he continued, "is a pretty complicated organic compound. One of the principal film-forming ingredients is a resinous material known as butylated di-methylol urea. Using the paper clips, let us see if we can show what it is and how it is made. Let this big clip represent carbon, the small one hydrogen, the round one oxygen, and the rectangular one nitrogen. (Fig. I).

Fig. I—Using paper clips to represent (reading left to right) atoms of oxygen, carbon, nitrogen, hydrogen.

"You have heard of urea. Urea was the first organic compound to be made synthetically. Friedrich Wöhler accomplished this synthesis in the year 1828. Urea is an organic compound composed of carbon, hydrogen, oxygen, and nitrogen. (Fig. III). You have also heard of formaldehyde, and I assure you that it has a great many uses other than being an ingredient of embalming fluid. It

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A Word to the Wise!

..."A word to the wise is sufficient," the old proverb runs. When it comes to finishes, a word to the wise is DURANITE. For DURANITE is not just another finish — it stands foursquare for a group of heat reactive finishes that have come through the most gruelling tests of war uses with the highest honors.

... DURANITES are custom built for your product—*developed, designed* and *proven* to meet the *exact needs* for metal products of all kinds. Many tough jobs have had DURANITES built for them. One may fit your need. If not, we can make one to suit. They are backed by the Zapon trademark—known for more than fifty years as a hallmark of *better finishes for better jobs.*

... At present, war work comes first and only a limited quantity of DURANITES are available for civilian production. However, we suggest that you consult us *now* in connection with your plans for postwar products. We will be glad to give you the facts and figures that prove that there will be no better finish in the world ahead than DURANITE.

NOTE THESE DURANITE QUALITIES!

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ZAPON

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ATLAS POWDER COMPANY

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INDUSTRIAL PRODUCT FINISHES ... *Doing Tomorrow's Job Today!*

is an organic compound composed of carbon, hydrogen, and oxygen.

"When a reaction takes place between one molecule of urea and two molecules of formaldehyde, dimethylol urea is formed. Pure dimethylol urea is a white powder. It dissolves readily in water to form a water-white, syrupy solution. When a film of dimethylol urea is cast upon a given surface and heat is applied, it converts to a hard, glasslike substance in a very short time. The film is brittle, lacks adhesion, and will crack badly if the panel is flexed. It is still water soluble enough so that its resistance to water is none too good. However, in the powdered form it makes an excellent plastic molding compound, and in solution form it is used to impregnate paper, cloth, and wood for the production of plastic laminates. It has little, if any, value as a protective and decorative finish because of its brittleness and lack of adhesion.

"Dimethylol urea is not compatible with alkyd resins or other plasticizers, and therefore cannot be made flexible. If, however, a solution of dimethylol urea in water is caused to react with butyl alcohol and the water is distilled off, the butyl radical (C_4H_9) enters the molecule and we now have butylated dimethylol urea—a compound which is soluble in organic

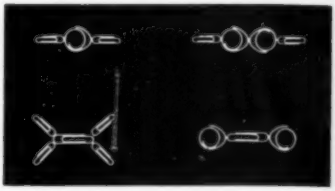


Fig. II—Certain atoms joined to make a molecule each of water (upper left); peroxide (upper right); methone and carbon dioxide.

solvents, compatible with alkyd resins and other plasticizers, and while still brittle and showing poor adhesion by itself, it can be blended with other things and thereby can be given some of the desirable qualities that would otherwise be lacking.

"Your miracle finish out there is basically a mixture of this resin with an alkyd resin, pigmented with titanium dioxide plus a little zinc oxide."

What Makes This Finish Bake So Fast

"But," interposed Bill, "what makes it bake so fast?"

"I'm coming to that," Jack replied. "Our finishes, not so many years ago, depended largely on the absorption of oxygen by the air to convert them to solid films. This was a slow process. It sometimes took three weeks to finish an automobile. Then we learned that we

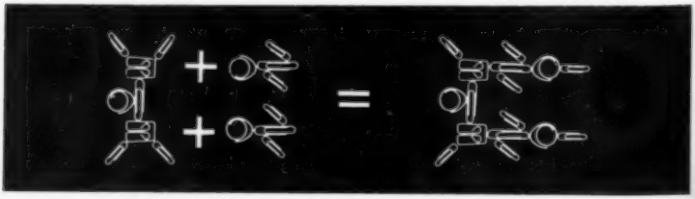
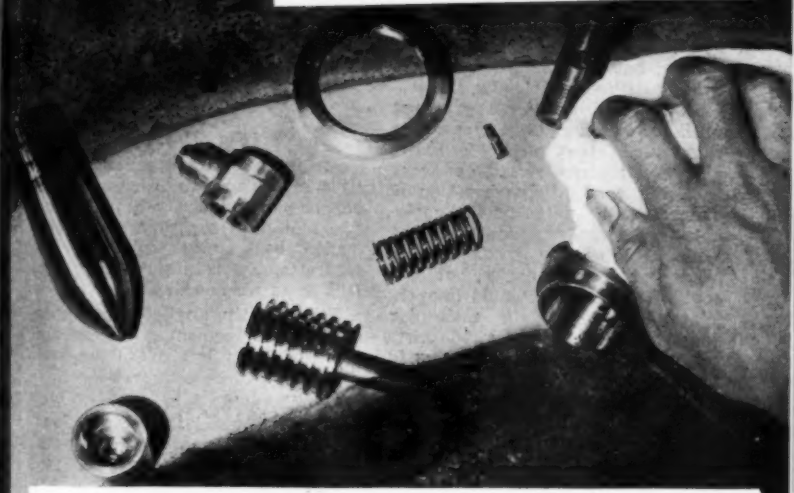


Fig. III—At left of the two plus marks you see one molecule of urea. At the right of plus marks there are two molecules of formaldehyde (one opposite each plus mark, one above the other). This combination equals a molecule of dimethylol urea—a dimethylol urea monomer.

SPEEDS AWAY OILY FILM

SLASHES DRYING TIME



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quickly removes dirty oil . . . evaporates cleanly . . . saves time

Produce the parts . . . clean them . . . and finish them fast! And one of the important steps in the production race is getting rid of that greasy film of dirt, gum and oil as quickly as possible. Every short-cut in cleaning is a cut in production time — that's what one large New York metal working plant discovered.

Drying time dragged and an oily film remained on metal parts they were producing. This slowed production and also the electroplating which was the next operation.

Film trouble vanished when they switched to Sun Spirits. Drying time was speeded up and better parts were obtained for electroplating.

For efficiency, economy and speed in metal cleaning, switch to Sun Spirits. This modern cleaner requires no heating . . . no mixing. Simply dip, wipe or brush parts . . . or use Sun Spirits in cleaning machinery designed for petroleum solvents. Write for details to . . .

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could hasten the oxidation process by the addition of the salts of certain metals such as lead, cobalt, manganese, and zinc. We also learned that we could hasten drying by applying heat, and our first baking enamels came into being. Here was our first attempt at utilizing the process of polymerization, but because we were still dealing with vegetable oils, the process was a slow one. It was not until some of the newer type resins came along that we were really able to put polymerization to work in a big way. Polymerization is defined as the union of like molecules to form a product of the same percentage composition. Water cannot polymerize, but if it could, here is what would happen. Water, H_2O, has a molecular weight of 18, of which 16 parts are due to the oxygen and two to the hydrogen. Thus, the water is composed of 11.1% hydrogen and 88.9% oxygen. One molecule of water would be known as a 'monomer'. A 'monomer' is the smallest unit into which a polymer may be divided. If two of these monomers of water could react, we would have a 'dimer' which would be a double molecule of the formula H_4O_2. Similarly, if three monomers could react, we would have a trimer, or a triple molecule of the formula H_6O_3. I suppose there are tetramers and pentamers, although I have never heard the terms used. Any combination of more than three is generally called a polymer and can be designated as (H_2O). If x equals 10,000, then our formula would become $H_{20,000}O_{10,000}$. But note that whether the formula is H_2O, H_4O_2, H_6O_3, $H_{20,000}O_{10,000}$ or (H_2O), the percentage composition remains 11.1% hydrogen and 88.9% oxygen.

"As we said before, this cannot happen in the case of water, but let us take another look at our molecule of dimethylol urea."

Atoms and Molecules of Different Elements United

"We see that it contains three atoms of oxygen, three of carbon, two of nitrogen, and eight of hydrogen. This is our monomer. Let's build another one just like it, put them together and we'll have a dimer." (Fig. IV).

As he spoke, Jack arranged the clips in the proper order on Bill's blotter pad and carefully joined the two molecules together. He then leaned back and puffed on his cigarette, apparently waiting for Bill to say something.

Bill silently studied the paper clips for a moment. "There are some of them left over," he said finally.

"Yes," said Jack, "there *are* some of them left over. Four hydrogen atoms and two oxygen atoms. I was wondering if you would notice that. What do you suppose we can do with them?"

Bill thought a moment before he answered the question. "We might make a couple of molecules of water out of them," he finally ventured.

"We not only might," said Jack, "but we will, for that is exactly what happens. When two molecules of dimethylol urea react, two molecules of water split off."

"But now doesn't your dimer have a different percentage composition than your monomer?" Bill was plainly puzzled as he asked the question.

"Yes, it does," replied Jack. "This is a slightly different type of polymerization reaction. Whenever two like molecules of a substance react with each other, but

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Post-war thinking is a healthy thing as long as it's kept in the back of our minds and OUT of our present production lines. It would be foolish NOT to think about making our post-war products with as great an "eye appeal" as possible. But the eye appeal that really counts these days is an olive drab or other war finish.

Here at M&W we are producing many kinds of industrial finishes built to Government specifications.

M&W's paints, lacquers and enamels are being used today on shells, bombs, hand grenades, aircraft, radios, torpedoes, and a host of other vital war materiel. They're doing a job which helps in a small way to "finish off" our enemies.

Let's all pull for Victory now. When the time comes for producing your post-war product — give it an M&W finish for eye appeal.

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in doing so, split off water or some other by-product, it is called a 'condensation' reaction."

"I see," said Bill. "What by-product other than water could there be?"

"In this particular case," answered Jack, "there couldn't be any other by-product, but remember that I told you that the resin in your refrigerator finish was a 'butylated' urea. This means that the butyl radical, C_4H_9, has replaced one of the hydrogen atoms in the dimethylol urea. When two of these molecules condense, the C_4H_9 can react with one of the OH groups and split off butyl alcohol, C_4H_9OH. Actually, you have both water and butyl alcohol being released in your oven at this moment.

"Building" a Small Polymer—Difficult to Show on Paper

"Now let's go a bit farther and build a small polymer," Jack went on as he arranged more paper clips on the blotter pad. (Fig. V).

"This looks very complicated," said Jack as he finished. "Actually, however, this is a very small polymer. A polymer of this size still wouldn't have developed much adhesion, hardness, or water resistance. The polymers being formed in your oven are several thousand times this size. If we tried to build one with paper clips, we would be here the rest of the year and would need the floor space of your entire finishing room to do it. Even then we wouldn't have a true picture of the polymer. We have built our paper clip polymer in one plane because of the limitations of our building material. Actually, these polymers are three dimensional and may grow in all directions, and the larger they grow, the harder, the more insoluble, and the more durable they become."

"Well, then," asked Bill, "is the film on our refrigerator just one big molecule?"

"No, it isn't, Bill," replied Jack. "It is composed of many millions of molecules, for while these polymers are large, as far as atomic distances go, they are still very small in terms of distances we humans are accustomed to measure. The ultimate size of a polymer is eventually limited by its own unwieldiness. Perhaps you noticed that I had some difficulty

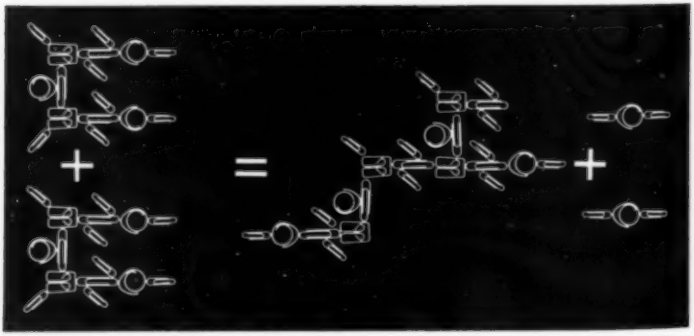
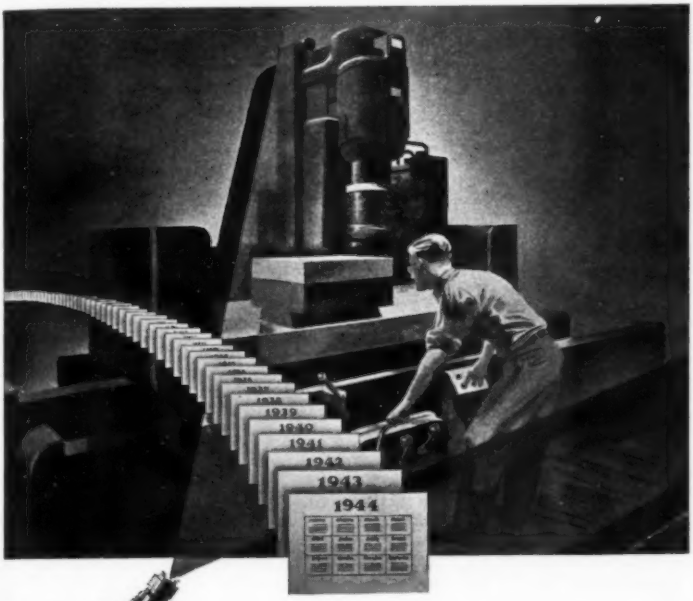


Fig. IV—At left you see two dimethylol urea monomers equalling (at right) a dimethylol urea dimer plus two molecules of water.



Design For Service To The Machine Tool Industry

(Beginning in 1929)

It is no accident that Lowe Brothers finishes have long been used by the majority of machine tool manufacturers. Here's the story!

Back in 1929, Lowe Brothers Finishing Experts went to The National Machine Tool Exhibition in Cleveland, to restore the finish on tools which were chipped or scarred in shipment. They have been doing it ever since!

In 1929, also, Lowe Brothers developed the standard machine tool color adopted by the Machine Tool Builders Association.

It was Lowe Brothers, too, who helped break the bottleneck in machine tool production caused by the slow-drying varnish type of finishes. Lowe Brothers were one of the first to develop a complete lacquer finish. It reduced application time by ⅔ by the spray method, cut drying time of each coat from overnight to 15 minutes, and provided a finish which holds up under constant action of cutting liquids.

Lowe Brothers finishes are the recognized standard of the machine tool industry. You can rely on Lowe Brothers broad experience with Government Specifications for machine tool finishes and industrial finishes of every type.

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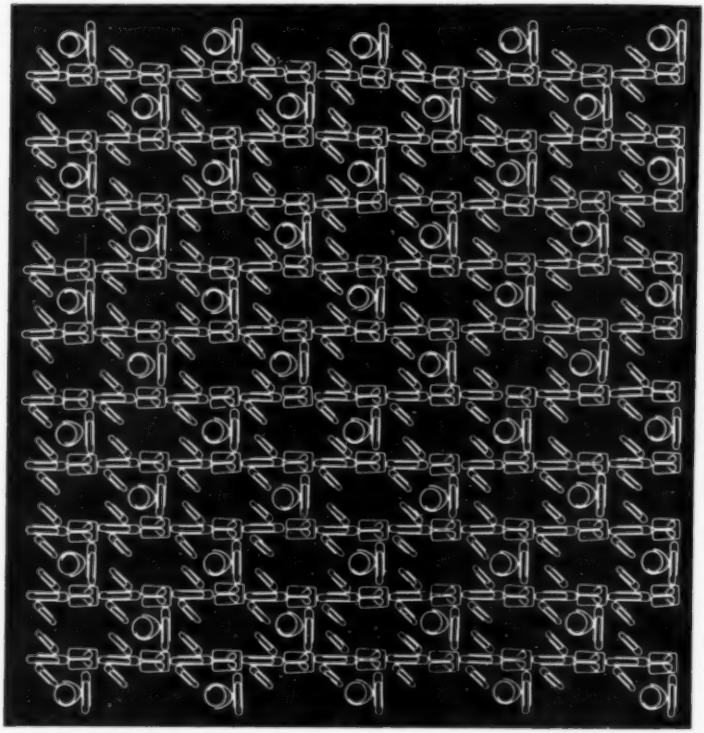


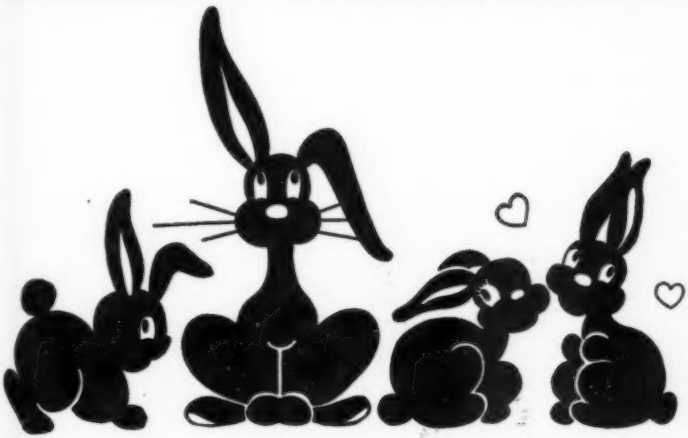
Fig. V—(Dimethylol urea monomers)x equals dimethylol urea polymer + (water)x.

in finding room to place all of our paper clip atoms in the molecule. There is a definite space limitation. As the molecules become cross-linked with each other and build up in size, there comes a time when there just isn't enough space for one of these CH_2 groups to wedge in and hook itself up to a nitrogen atom. When this happens, the growth of the polymer must stop. This mechanical limitation to chemical growth is known as 'steric hindrance', and is the headache of organic chemists.

"Because these cross-linkages take place," Jack went on, "your finish comes out of the oven hard, even though still very hot. When we have cross-linkage, we have a 'thermosetting' resin. You have seen acrobatic monkeys swing from the limbs of trees hanging onto one another's tails. These 'monkeymers' have formed what is known as a 'straight-chain' polymer. Finishes that undergo this type of polymerization are 'thermoplastic'. The vinyl resin finishes exhibit this characteristic."

(Continued on page 52)

STEADY PRODUCTION



FOR HIGH SPEED production schedules switch to lacquer finishes. Lacquer is easy to spray and quick to dry. The colors are bright . . . the tough film resists abrasion, grease, water, alcohol, and many chemicals. Lacquer is an ideal all-purpose coating for hard service in any climate and under all conditions.

C.S.C. makes no lacquers or thinners but supplies solvents and plasticizers to manufacturers of protective coatings.

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To Speed Drying of Film Employ "Catalysts"

"When we wish to speed the drying of an oil enamel, we add driers. The chemist would call them 'catalysts'. Catalysts either speed up a reaction by their mere presence, or they enter into the reaction and are regenerated in their original form by the time the reaction is completed. At any rate, they are not consumed in the process. In polymerization reactions, we consider heat an excellent catalyst, because the more heat that is applied, the faster the cure becomes. There are other catalysts, too. Benzoyl peroxide is one that is used quite commonly in some polymerization reactions. For our urea polymers, simple acids do the trick."

"You mean," interrupted Bill, "that by adding acid to the enamel we can shorten the bake still more?"

"Yes," replied Jack, "we could, but I wouldn't advise doing it. If you added a little more than a little, it would be by much too much. A thimble full in a drum would be a lot, unless the acid were very dilute. Films that are acid catalyzed to cure are very often brittle and lack adhesion and toughness. By the same token, alkalies retard the cure. Pigmented films high in zinc oxide, for example, will cure more slowly than when the zinc oxide is omitted."

When Some Areas Show Flat Instead of Glossy

"By the way," said Bill, "occasionally some of the boxes show areas where the finish is flat instead of glossy. How do you explain that?"

"That," said Jack, "is the result of surface catalysis. Somehow or other, acid fumes crept into your oven. Acid catalysis took place at the film-air interface and caused the surface of the film to cure considerably faster than the main body. Curing is always accompanied by shrinkage. As the under part of the film cured and shrank, the case hardened surface puckered in its attempt to adapt itself to the change in volume. If you examine one of those flat spots under a microscope, you will observe that the surface is finely wrinkled. Light rays impinging upon it are scattered, giving the visual effect of low gloss.

"Vapor degreasers are a common cause of such flattening. Trichlorethylene vapor is extremely heavy. Therefore if the condensing coils in the degreaser do not have the capacity to condense all of the vapors produced by the steam coils, they spill over the sides of the tank and settle to the floor. Drafts carry them incredibly long distances. They have been known to travel down stairways or other openings in the floor and contaminate ovens on the floor below. There is a natural draft toward the oven which is created by the demands of the burners for air. If the trichlorethylene vapors pass through the burners, they are decomposed, and hydrochloric acid is one of the decomposition products. Hydrochloric acid is a very strong acid, and it doesn't take much of it in the oven to produce surface catalysis and resultant flat spots. The flat spots will generally occur where the film is heaviest or where extra metal mass, such as a reinforcing bar, may cause the body of the film to cure more slowly.

"Acid fumes may also come from your plating baths, if the drafts are just right, or they may just be the result of poor ventilation in the oven itself.

(Continued on page 56)

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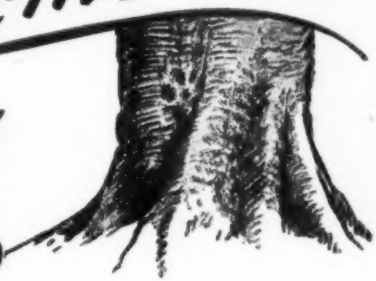

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Moisture Repellent

SEALER No. 30

Like the bark that protects the tree, Moisture Repellent Sealer No. 30 is *perfectly adapted to the natural characteristics of wood.*

No. 30 is unaffected by expansion or contraction—and it flexes with the wood, thus overcoming the effects of strain or vibration. It permeates deeply and thoroughly, producing a dependable moisture-resistant seal that remains effective under all climatic conditions. Provides a perfect bond for the finish that goes over it.

Whether your methods call for dipping, brushing or spraying, you will find that this outstanding sealer meets the most exacting production needs.

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Made by an organization that has taken a leading part in the development and manufacture of plastic synthetic coatings—and backed by a name that has stood for the highest quality in finishes since 1865.

Conforms with Specification AN-S-17

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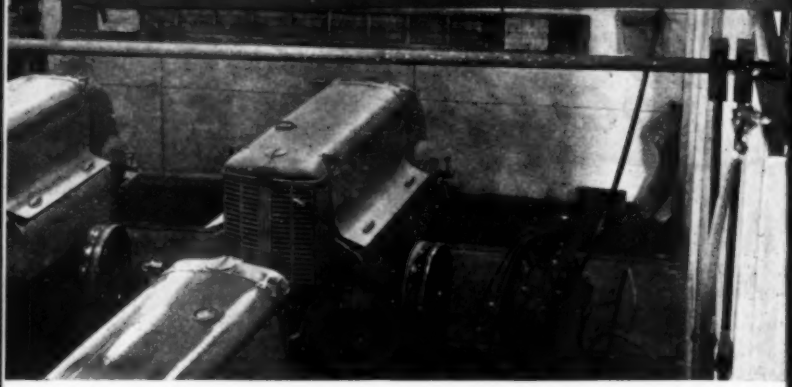

Another complete BINKS spray painting system

Air, when ladened with paint fumes, is a definite hazard . . . both health and fire. In the modern Franklin Plant of the Chicago Pneumatic Tool Company, where the well-known Chicago Pneumatic Portable Compressors get their protective coat, a Binks Spray Painting System applies the finish and washes the paint out of the air after it has used it. This is done with the large down-draft water wash spray booth shown here. The air enters the booth through the open top and is drawn down through the grills in the floor. Below the floor the air is so thoroughly washed that it can be vented back into the room from which it was originally taken.

If you have a finishing problem, remember: NO SPRAY PAINTING JOB IS TOO BIG OR TOO SMALL FOR BINKS EQUIPMENT.

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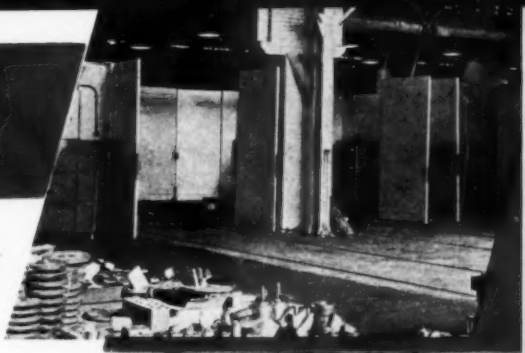
# of AIR



The units to be finished enter the spray booth through doors on one side and leave through doors on the other.

The grilled floor through which the paint ladened air is withdrawn is shown here. The truck is for heavy units without wheels.

A Chicago Pneumatic Portable Compressor in the field. On jobs like this a good finish is needed protection against rust and corrosion.

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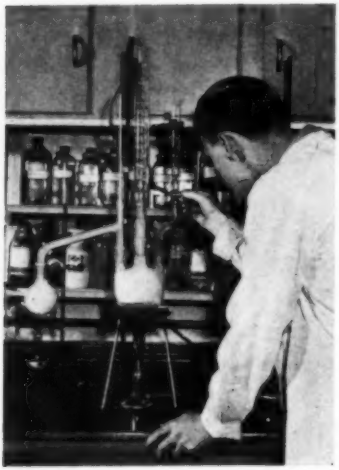
"Whenever combustion takes place, carbon dioxide is generated and this, in the presence of moisture, (also a product of combustion) forms carbonic acid. Carbonic acid is a weak acid, but if it builds up in sufficient concentration, due to poor ventilation, surface catalysis can occur."

What Retards Paint Drying; Thick Film; Thick Metal; and . . .

"What causes variations in hardness from day to day?" asked Bill.

"There should not be any variations in hardness if your baking conditions are carefully controlled.



Chemists strive for dependable results.

Polymerization speed is essentially a function of time vs. temperature. When one goes up, the other goes down. However, there are other influencing factors. Film thickness is one. Whether drying is by evaporation, oxidation, or polymerization, increasing the film thickness retards it, and for the same reason in each case. Obviously, in a thick film, there is more work to be done with the available forces. Metal mass is another. The metal *must* come up to heat before the film will cure, and the greater the metal mass, the longer it will take. There is no such thing as curing a film from the outside in. Even if there were, it would not be a desirable thing to do. Case-hardening, solvent trapping, pinholing, wrinkling, and other film defects are frequently caused by applying a sudden blast of heat to the surface of the film, but it will remain soft underneath until the metal temperature reaches the point necessary to effect a cure. Thus, the finish on a casting will not cure to as hard a film under a given set of baking conditions as will the finish on a piece of sheet metal.

Other Things That Slow the Drying of Bake Enamels

"A third factor is catalysis or anti-catalysis. If you add anything to your enamel that increases the acidity, the cure time is reduced, or you will get a harder film in the same length of time. Decreasing the acidity has the opposite effect."

"I don't ordinarily add acids or caustic soda to my mixing tanks," observed Bill drily.

"Of course not," laughed Jack, "but some day you might decide that the enamel needed some doctoring to correct a minor fault, and if whatever you add changes the acidity, the cure will change with it. Acid or alkali contamination is unlikely, but small amounts of either can change the curing characteristics appreciably.

"Solvent release is still another factor. Solvents that are slow in leaving the film will retard the

(Continued on page 60)

PAINTING SYSTEM FOR GAS MASKS

Planned to Meet the High Efficiency Manufacturing Standards of the CROWN CAN COMPANY

an unusually COMPACT and COMPLEX Installation

When the Crown Can Company, of Philadelphia, Pa., contracted for production of *Combat Gas Mask Canisters* they, to use their own expression, called upon Mahon "how-to-do-it" to design and build the finishing equipment. In this installation it was essential that all finishing operations—cleaning, banderizing, painting and baking—be confined to a space 103 feet long, 18 feet wide and 18 feet, 8 inches high. Likewise, it was imperative that a production of 49 completed *Canisters* per minute be maintained throughout the finishing operations. Diligent research and careful engineering produced a mechanism that closely parallels in economy, speed and precision the long established high-efficiency manufacturing standards of the Crown Can Company. In operation, it resembles a mammoth printing press and, like a printing press, it is entirely automatic, except for loading and unloading.

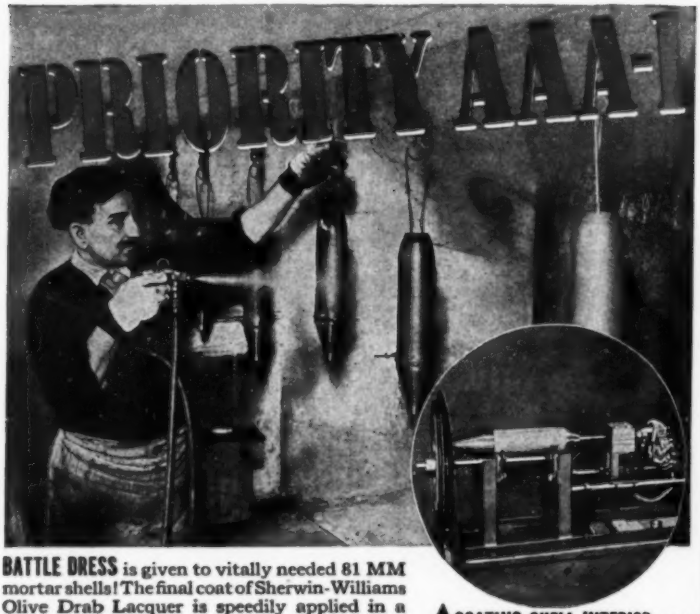
As parts arrive from the presses on conveyors, they are hung on hooks, specially designed to allow for drainage without marring. These hooks, 36 to a bar, are an integral part of the continuous bar conveyor system. Proceeding straight up and through the cleaning and banderizing tanks and perpendicular dry-off oven, parts are automatically carried to the paint dip and through the baking oven and, finally, out to the unloading tables, completing the entire travel through the maze of intricate finishing operations in 45 minutes.

★ ★ ★

Mahon "how-to-do-it" has been the answer to many finishing and processing problems. It may solve your problems, too.

THE R. C. MAHON COMPANY
DETROIT 11 CHICAGO 4

Manufacturers of Metal Cleaning Machines • Rust Proofing Machines • Hydro-Filter Spray Booths • Ovens of All Types • Filtered Air Supply Units • Hydro-Foam Dust Collectors—and Many Other Units of Special Production Equipment—including Complete Finishing Systems



BATTLE DRESS is given to vitally needed 81 MM mortar shells! The final coat of Sherwin-Williams Olive Drab Lacquer is speedily applied in a special conveyor spray booth at the Enamel Products Company, Cleveland, Ohio. Each shell is coated in ten seconds, dries before going 25 ft (less than one minute)!

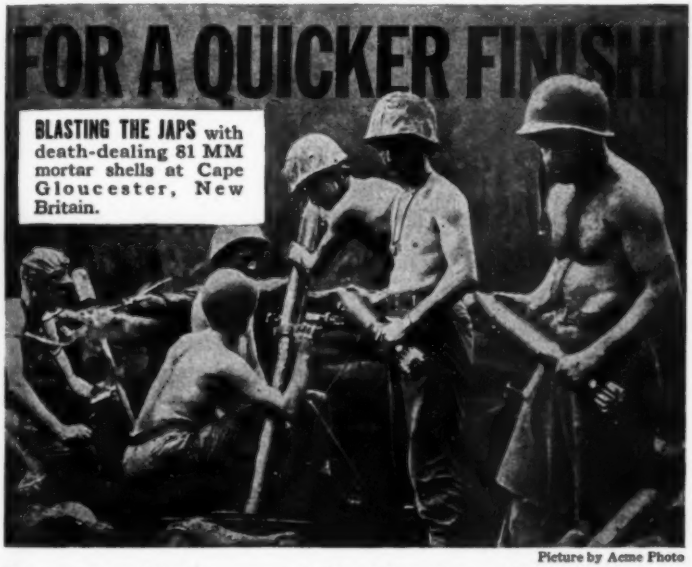
COATING SHELL INTERIOR with a Sherwin-Williams acid-proof black finish by means of an ingenious long-nozzled spray gun.

SHINY NOSES are given shells by buffing before interior finish is applied.

INSPECTION of *cavity* for *defects* before the interior finishing operation.

FINAL INSPECTION includes coating with films of fine oil and grease.

SHERWIN-WILLIAMS



Picture by Acme Photo

SHERWIN-WILLIAMS helps The Enamel Products Co. Speed 81 MM Shells on Their Way!

Production of deadly 81 MM mortar shells is one of the nation's highest priority "hot jobs." The U.S. needs them *fast*—yet in accordance to strictest specifications!

To lick one of the problems, speed on the finishing operation, The Enamel Products Company first designed ingenious new spraying equipment. Then Sherwin-Williams technicians produced two improved finishes: a corrosion and acid-proof black coating for the TNT loaded shell interiors, and a high-speed drying exterior olive drab lacquer. Soon, shells were speeding toward the front.

This experience of The Enamel Products Company, Cleveland, Ohio, is but one example of the cooperation that the Sherwin-Williams Co. is willing and able to offer. Perhaps we can help *you?* Write the Sherwin-Williams Co., Cleveland 1, Ohio.

INDUSTRIAL FINISHES

cure because they hold the temperature of the film down as long as they are present. However, if you get variations in cure, look first to your ovens, next to your film thickness."

Jack looked at his watch. "It's about quitting time and I don't want to detain you," he said. "Do you still believe in miracles?"

"I do," replied Bill, "but I believe this one is a bit more understandable. Thanks a lot for explaining it to me."

They shook hands and Jack departed. Bill donned his coat and hat and walked in the direction of the factory exit. As he passed the finishing line, he stopped for one last inspection. Horror of horrors!! What was this? Bill stepped closer to the door panel that had attracted his attention, and right in the center of it was a huge blister.

"Boy!" he said as he marked the panel for rejection, "That polymer *really* got out of hand."

Author's Note: The idea of using paper clips to portray polymerization processes was that of Dr. A. G. Chenicek of the Research Laboratories of the Interchemical Corp. We wish to thank Dr. Chenicek for permission to use his idea. We also wish to thank Mr. James Chapman and Mr. Lester C. Anderson for the photographic reproduction of the molecules.

Walter Kidde & Co., Inc., Acquires Youngstown Miller Co.

Walter Kidde & Co., Inc., Belleville, N. J., announces that as of January 10, 1945 they have purchased the capital stock of the Youngstown Miller Co., Inc., formerly of Sandusky, O., manufacturers of plastic coaters and oil reclaimers. On or before March 31, 1945 all operations will be transferred to 675 Main St., Belleville, N. J., where orders on hand will continue to be filled under the direction of F. L. Gerin, who becomes Vice President and General Manager. Other officers of the new subsidiary of Walter Kidde & Co., Inc. will be John F. Kidde, President, Harold A. Cartier, Vice-President, G. Crosby Hiss, Secretary and William Deyerberg, Treasurer and Comptroller. R. E. Strobel will continue as Sales Manager for the Youngstown Miller products.

More Production of Melamine

Monsanto Chemical Co., St. Louis, Mo., announces that it will soon begin volume production of melamine, a century-old Swiss chemical, neglected for years and now found to possess utility in a wide range of war applications as well as almost limitless peacetime possibilities.

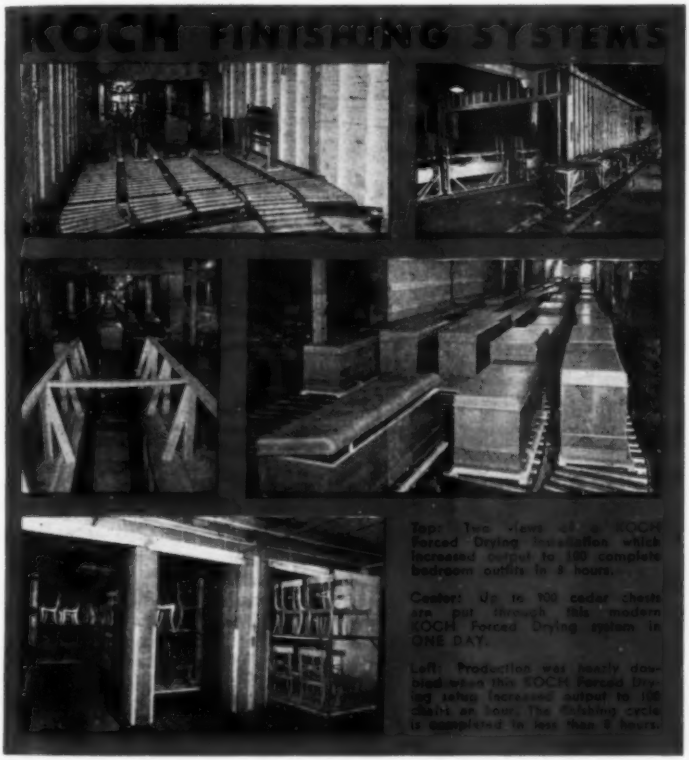
Melamine is technically known as a member of the tri-amine family, and Monsanto research techniciana have reacted it with formaldehyde to produce startling results in such fields as plastics and plywood manufacture.

Detrex Corporation Advances Two Executives

A. O. Thalacker has been elected to Vice-President and General Manager of Detrex Corp., Detroit, Mich., manufacturers of industrial cleaning equipment and chemical cleaning compounds. Mr. Thalacker joined the organization in 1937 and since that time has held the executive positions of Assistant Secretary and Secretary, which office he held prior to his recent promotion. Research activity in field and laboratory has been considerably expanded by Mr. Thalacker in the company's Industrial and Alkali divisions.

A. O. Thalacker is now Vice-President & General Manager of Detrex Corp., Detroit, Mich.

E. W. Allison, who has been in the legal department of the firm since 1941, is now Secretary. In his new office, Mr. Allison has supervision over the legal and personnel divisions of the firm.



Top: Two views of a KOCH Forced Drying installation which increased output to 100 complete bedroom outfits in 8 hours.

Center: Up to 900 cedar chests are put through this modern KOCH Forced Drying system in ONE DAY.

Left: Production was greatly doubled when this KOCH Forced Drying setup increased output to 150 chairs an hour. The finishing cycle is completed in less than 8 hours.

GET THE FACTS ABOUT FORCED DRYING

KOCH
SONS, INC.
INDUSTRIAL EQUIPMENT
EVANSVILLE 4, . . . INDIANA

Find out how you, too, can save time and materials, cut down rejects, and boost production with the same labor and floor space . . . regardless of outside weather conditions.

KOCH engineers have prepared an illustrated bulletin telling all about Forced Drying. It gives facts and figures—describes various types of installations. Send for your copy of Bulletin AB-37 today—no obligation.

COATINGS FOR

Fresh Water Tanks in Submarines

Brown metallic paint, clear phenolic varnish, cement wash, zinc dust, electrical treatment.

BY ROY F. PERRY
Chief Safety Inspector
Electric Boat Company

NOAH put water in kegs and it's been kept in kegs ever since — until war developments within the last few years have brought us new techniques for coating the insides of steel tanks in submarines so that an adequate supply of water can be stored indefinitely.

Heretofore, the minerals in water caused the steel plates in the fresh water tanks of submarines to rust. Likewise, the minerals ate through tin cans used to store emergency water rations for lifeboats.

One protective coating applied to steel plates in the fresh water tanks of submarines is known to have had the property of protecting steel from a rust attack, but it tainted the water so badly that it was unsatisfactory for drinking purposes.

This problem of developing a coating that would protect metal from corrosive or degenerative action, and at the same time keep the water palatable, has been approached in several different ways with varying success.

1—Brown Metallic Paint

Brown metallic paint was the first protective coating applied to the interior of potable water tanks on submarines, with even a small measure of success. This film resisted corrosion, but for an insufficient length of time. It was highly toxic when applied in confined spaces such as fresh water tanks are in submarines. The metallic paint tainted the water and a more satisfactory finish was sought.

2—Cement Wash

Another and more promising method was the application of a cement wash—a mixture of fire clay, cement and water. The surface was first thoroughly cleaned by applying paint remover and then following with power brushing. The cement wash was brushed on easily, with lack of odor. The drawbacks of this method are the degeneration of the cement film, with resultant corrosive ac-

Resourcefulness....

THAT IS WINNING THE WAR!

From custom electric signs and theatre marquees, to conveyor line production of radar cases! This is the story of Donnelly Electric and Manufacturing Co. (Division of Donnelly Advertising Co., Boston) contribution to victory!

Plans were made for top production. Equipment was selected and space was utilized with this goal in mind. Handling operations and time between operations had to be minimized. The finishing system we recommended is a progressive, two-handling, continuous operation. Parts are hung on conveyor and pass through priming booth. Berry Brothers' #10 Ferro-chrome Primer is applied and the parts then travel seven minutes to the enamel booth.

At the entry to this booth, the first coat of Berry Brothers' Infra-bake 4.5 Gray Semi-Gloss Enamel is applied. The parts then travel five minutes to the next spray station and the second coat of enamel is applied. Then they go through the infrared unit for 7 minutes, and to the shipping department.

Without products tailored to fit the required timing, a longer conveyor, more floor space and less production would have resulted. This same "Know How" is available to you. Write for further information.

BERRY BROTHERS

Paints · Varnishes · Enamels · Lacquers

Detroit 7, Mich. Walkerville, Ont.

Chicago • St. Louis • Boston • Jersey City • Cincinnati

SEE OUR INSERT IN SWEET'S NEW PRODUCT DESIGN FILE

QUALITY FINISHES SINCE 1858

tion behind the coating; and the flakes which fall off eventually plug up the pipes.

3—Clear Phenolic Varnish

This method produces a hard finish that definitely prevents corrosion. The surface must first be prepared. This is done by cleaning it with paint remover, and then power brushing to the bare metal. Care is taken to have the tank thoroughly dry inside and out before clear phenolic varnish is applied. (This means the process has to be done while the ship is either on the building ways or in drydock). After the varnish is applied, electric heaters are installed in the tanks to bake the film four hours at 225°F.

There are many advantages to the clear phenolic varnish method. The hard baked finish does not degenerate or permit corrosion, and it is the easiest and quickest to apply. The disadvantage is the objectionable taste of varnish in the water.

4—Zinc Dust

The application of zinc dust, mixed with phenolic varnish, is a recent development, which is really a modification of the clear phenolic varnish process intended to combine two desirable properties in the resultant film:

A) Protect steel plates in fresh water tanks from corrosive or degenerative action.

B) Permit water to be stored in a tank coated with zinc dust, without any appreciable change in the taste of the water.

Foresight is used in preparing the surface and applying protective coatings of zinc dust, because it is regarded as the toughest most hazardous operation for painters in submarine construction. This foresight minimizes the hazards as much as possible and increases the speed with which the operation is completed.

Tank sections are stripped on the ground, using paint remover and power brush. Two coats of zinc dust are applied and the sections are then placed in position in the ship. The tank is now completely enclosed, quarters are cramped and entrance is gained through a manhole. The surface not already prepared is stripped and two coats of zinc dust are applied. Finally, the burrs are touched up and possibly a third coat of zinc dust is brushed on all over the inside of the tank.

There are also drawbacks to this process. Zinc dust takes longer and is tougher to apply than any of the other coatings mentioned. Fumes from the zinc dust process are extremely toxic, and strict enforcement of safety rules and the use of safety devices provided are absolutely necessary. Otherwise the men would be drunk as lords at the end of the day and deathly sick by night. If zinc dust is mixed with a vehicle and left in a sealed can, there is danger of explosion. The zinc dust mixture settles and the pigment on the bottom becomes lumpy within 24 hours. It can't be mixed up again, so it is economical to mix only what is to be used.

However, zinc dust has now been used as a coating in fresh water tanks of submarines for over six months, and it is fair to assume that it has the desirable properties and has proved entirely satisfactory until reports are received to the contrary.

5—Electric Treatment

The latest improvement in storing water on boats has been developed by the Multiple Breaker Co. It is a secret, special process in which the water is treated

Steel comes to life in the natural BEAUTY OF WOOD

Plan now to give postwar products real *Eye Appeal* with Glidden Graining Materials

Never before have industrial finishers been in a position to achieve such results on products of steel! For today, with versatile Glidden Graining Materials and advanced tools for application, finishers can bring steel to life in the natural beauty of *any* wood known to man.

Years of concentrated research by Glidden have produced a line of quality graining materials so complete we now can say: Bring us any grain pattern and we will give you a formula for matching the colors perfectly. Or, our Color Laboratory will suggest appealing color combinations and types of wood grains for your product. We will even tell you where to get the best graining plates and, if special problems arise in your finishing department, we will send an engineer to analyze them.

Begin *now* to plan real eye appeal for your postwar products through graining. Begin by writing us for expert help every step of the way.

THE GLIDDEN COMPANY
Cleveland 2, Ohio

TIME-TESTED

GLIDDEN · *Pacemaker in Paints*

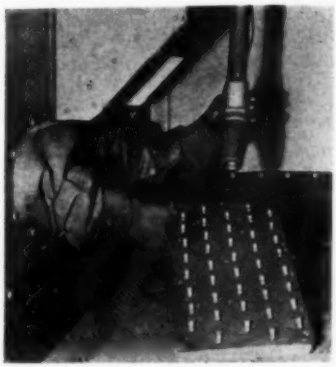
electrically and then stored in cans. The government has adopted this method of storing water and has made it mandatory on all merchant shipping. Three million cans of water have been sold to the merchant marine, and the company is now working on a large contract to supply water for the army quartermaster corps for army transports. Warships are not using canned water, but are expected to soon.

Lack of storage space on submarines makes it highly improbable that canned water will be used on undersea craft in the near future, thanks to experiments made with protective coatings. The crew on a submarine today should never have occasion to voice the line from the Ancient Mariner, "Water, water, everywhere, and not a drop to drink."

Blast-Cleaning Cabinet Technique

FULL-TIME operation of blast-cleaning cabinets, a vital necessity in the production of war supplies, has been made possible as the result of an application which was first tried by Ithaca Gun Co. to protect the perforated bottom of a much-used blast-cleaning cabinet. Experience had shown that the force of the steel grit, driven over the parts at 90-lbs. pressure, quickly wore through the boiler-plate, necessitating replacement every three or four hours.

A sheet of compar, the flexible rubber-like plastic developed by Resistoflex Corp., fastened securely to the bottom of the cabinet, proved to be a satisfactory solution to the problem, with a resistance to abrasion 250 times that of the boiler-plate. This new arrangement assures continuous operation for several months, with no stoppages for replacement.



A peek inside blast-cleaning cabinet, showing how small parts to be treated are mounted on a tray covered with compar (flexible rubber-like plastic).

Likewise the wooden tray that holds small parts to be sandblasted is covered with a sheet of the flexible compar. Although this tray is held directly below the nozzle through which the abrasive steel grit is driven with tremendous force, the compar covering shows no wear after months of continuous use.—N. E.

Optimus Detergents Co. Adds to Staff

The Optimus Detergents Co., Matawan, N. J., manufacturers of metal cleaners, and industrial cleaning materials for production and maintenance use, announce the appointment of Joseph S. Brady as Technical Supervisor, and A. C. (Neil) Daly as Technical Field Representative.

Mr. Brady will be in charge of the Optimus Technical Laboratory. Mr. Daly will be assigned to special technical work in the field. Both will also work in conjunction with the Optimus affiliate, Optimus Equipment Co., of Matawan, N. J., manufacturers of metal cleaning equipment and dryers.

VITA-VAR

Can Coatings Protect Their Food!

Vita-Var Can Coatings for outside and inside of food and pharmaceutical cans protect containers used by the Armed Forces. They assure complete protection against rust and the corrosive action of food products.

Today, we can take care of your requirements of finishes for the Armed Forces. When your production is converted to civilian uses, we will be ready to supply you with the latest developments in synthetic finishes for every purpose.

Write for the Vita-Var Product Finishes Folder giving information on Can Coatings and other finishes —

VITA-VAR CORPORATION

PAINT ENGINEERS SINCE 1868 NEWARK, NEW JERSEY

DU PONT PAINTS
A BRIGHTER
TOMORROW

. . . with finer finishes . . . new materials and methods . . . better-than-ever products

AT RAINBOW'S END shines the promise of a brighter tomorrow. And Du Pont research will help bring it to you. Bubbling in the retorts of Du Pont Laboratories are new and better finishes that will add color—sales appeal—durability—value—to everything you make. War has spurred the development of many new materials and methods that—when the curtain rises on the post-war world—will amaze and delight you. And they will be brought to you by the same Du Pont research that gave you DUCO and DULUX.

But right now, war needs come first. Since war began, Du Pont has offered the services of its finish engineers and Research Laboratories. Du Pont has helped hundreds of war industries break bottlenecks. We'll be glad to help solve *your* wartime finishing problems. Call on us for war service. Call on us, too, if you're planning a new and better product for that brighter tomorrow—provided it does not interfere with the war effort. E. I. du Pont de Nemours & Co. (Inc.), Finishes Division, Wilmington 98, Delaware.

DU PONT

FINISHES DIVISION

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

DU PONT

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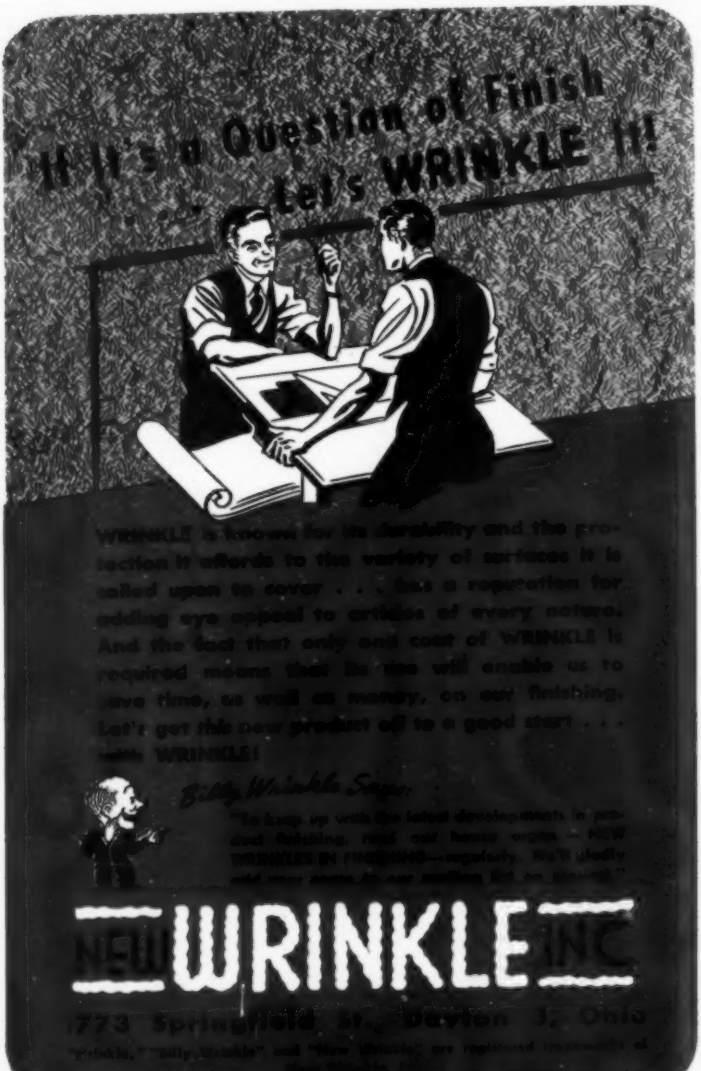

If it's a Question of Finish
Let's WRINKLE It!
WRINKLE is known for its durability and the protection it affords to the variety of surfaces it is called upon to cover . . . has a reputation for adding eye appeal to articles of every nature. And the fact that only one coat of WRINKLE is required means that its use will enable us to save time, as well as money, on our finishing. Let's get this new product off to a good start . . . with WRINKLE!
Billy Wrinkle Says:
NEW WRINKLE INC
773 Springfield St., Dayton 1, Ohio

Some Typical Troubles and What Caused Them

Paint service engineer tells about some of his experiences in uncovering real causes of unsatisfactory performance in product painting operations and explains what can be done to prevent their recurrence.

BY J. EMVEE

EVEN though we have progressed a long way in the use of improved finishing materials, equipment and methods — to simplify things for the finishing of all types of products—we still have finishing troubles; and some of them are quite serious until they are solved. Problems are just as numerous today as they were 20 years ago. I know because I call on many industrial finishing departments.

In metal finishing, most troubles can be traced to the initial cleaning and preparation of the metal surfaces. Of course, some troubles occur because concerns have to get along with inexperienced help and, in a few cases, a paint failure is due to negligence somewhere along the line.

They Added Thinner, but Paint Became Thicker

Recently I received a long distance telephone call from a large manufacturer who was finishing metal parts for an Army Air Corps contract. The man was excited and insisted that I come at once and investigate the trouble in his finishing room. His complaint was that the more reducer his man added to the olive drab lacquer, the heavier it became; and that eventually the lacquer curdled. Also, the adhesion of lacquer to metal was poor, the color was not right, etc.

I went to the plant and started an investigation. The facts were as explained over the telephone. First, I questioned the man who did the mixing. Then I went to the mixing room. Here I found four drums with contents labeled as follows: Lacquer olive drab; synthetic olive drab; lacquer thinner; and synthetic reducer.

The man who attended to the mixing declared that he was sure he used lacquer thinner for the lacquer olive drab material. To make certain, we tried it. Sure enough the olive drab lacquer gained body when thinner from the lacquer thinner drum was added to it. Well, I knew that wasn't right, so I went to the store room, found a new untouched drum of lacquer thinner, and drew some thinner from it. As I expected, this thinner worked the way lacquer thinner should work.

How Gasoline Got Into Lacquer Thinner Drum

The trouble was all in the one drum in the mixing room. Here is what had evidently happened: Someone had been using several gallons of gasoline to remove the surface grease from a batch of

metal parts. The gasoline was obtained (probably for convenience at the time) in 5-gallon cans which bore a lacquer thinner label. After the workmen were through using the gasoline, and having no further use for what had not been used, one of the men, without thinking, emptied the cans of unused gasoline into the lacquer thinner drum. This incident may seem

It would have been all right if the contents of containers had been what their labels indicated.

absurd to many practical men, but it happens more frequently than you might believe possible.

Paint Wouldn't Stick to Aluminum Parts

In another complaint, a concern was having trouble with poor adhesion of paint on metal parts. The firm was coating small aluminum parts with a black baking enamel. Adhesion of paint to metal began to go bad, and it got worse from day to day. Finally an investigation was started. First, the production procedure was carefully reviewed. It was as follows: The parts were degreased. After degreasing they were treated with a 2% chromic acid solution and rinsed with hot water.

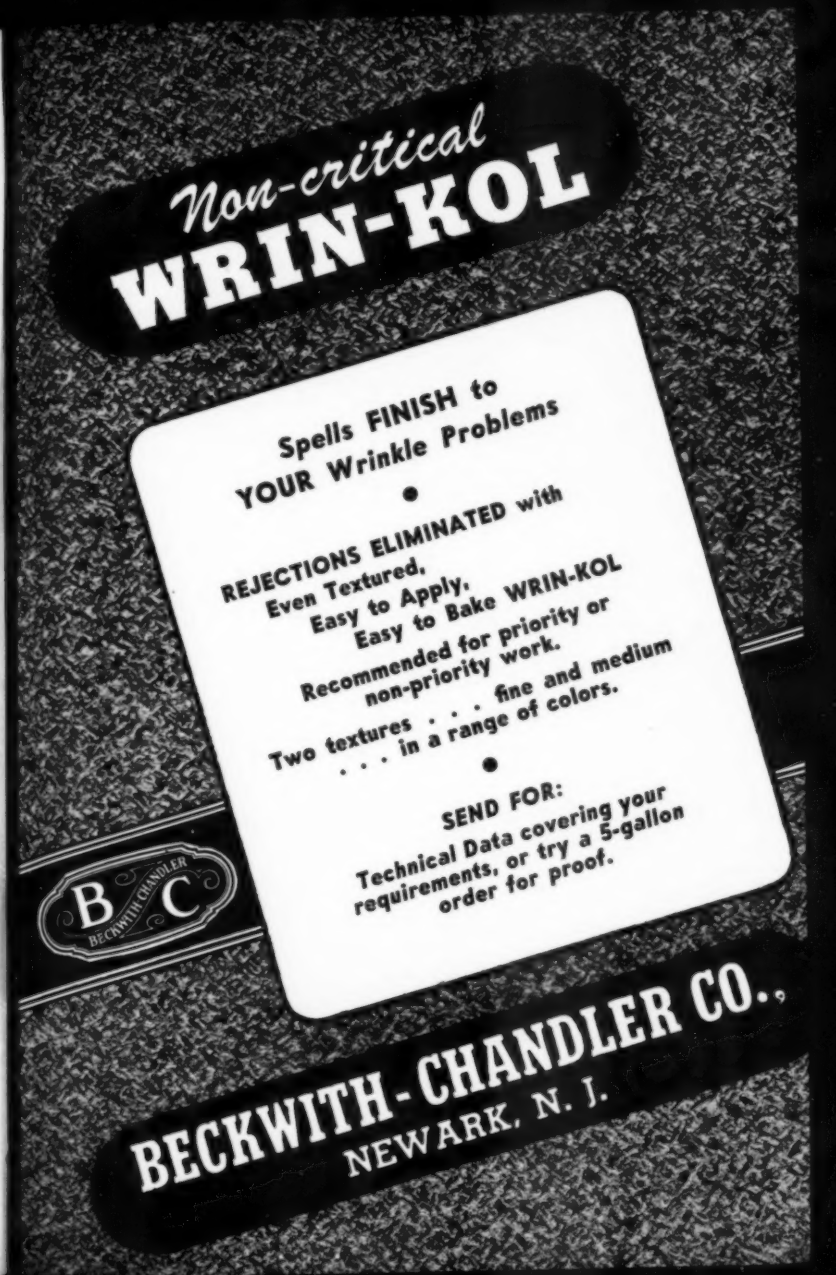
All went well—until eventually the regular chromic-acid tank used for this job developed a leak. However, they had another chromic-acid tank containing a 13% chromic acid solution, so they began using it. Also, because a cold water rinse tank was more accessible to this latter tank, someone decided to use the cold water rinse.

Naturally the aluminum parts treated with this stronger solution retained a coating of chromic acid when lifted from the tank, and this acid was not completely removed by the cold water rinse. It was this trace of chromic acid on the surface of aluminum parts that was preventing the paint from adhering to the metal properly.

Traces of Alkali Cleaner Ruined Paint Adhesion

Recently I was called to the plant of a company making steel shell cases. This firm also complained of poor adhesion. The shells were washed with a hot alkaline cleaner and rinsed in hot water. The company had no method of determining the strength of alkali cleaner in the cleaning tank; and the temperature was guesswork, since no thermometers were on hand to indicate the exact temperature of either the cleaning solution or the rinse water. Occasionally there was too much alkali in the cleaning tank and not enough overflow of clear hot water in the rinse tank, so that after a period of time the rinse water became almost as strong with alkali as the cleaner solution itself. As a result, a deposit of free alkali remained on the surface of the shell cases and this prevented the paint from adhering to them properly.

No paint coating will adhere properly to a metal surface unless that surface is thoroughly cleaned. Proper cleaning means not only the complete removal of dirt and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NEWARK, N. J.

grease, but also the removal of any chemical cleaning compound that may be used in the cleaning process. This is why clean hot water rinses usually follow any chemical cleaning operation. If every concern that uses paints or finishing materials in product painting would establish and maintain a control laboratory (on a small scale, of course) 90% of their finishing room troubles would disappear.

Wire Brushing Metal Chair Bases

POWER-DRIVEN rotary wire brushes are used for removing weld scale, rust and shop dirt from swivel chair basis in a plant located in Ohio. The use of rotary brushes has increased production on this operation 300%, eliminated the use of objectionable chemicals, and reduced setup costs, according to reports received by The Osborn Mfg. Co. of Cleveland, Ohio, producer of power brushes.

The new method makes it possible to clean 30 chairs an hour, or three times as many as the 10 per hour that was standard practice under the former system. Power brushing also eliminates work that was harmful to workers' hands and clothing—the use of acid solution which were used in preparation for rust removal and the hand-wiping that followed.

Power brushes being used on this production job are of the interlocking hub type which permits the use of as many sections as are necessary up to widths of 3-ft. or wider. The brushes usually employed on this operation are 12-in. in diameter, with 5/16-in. sections of .0104 wire. They are mounted on standard polishing lathes operating at speeds of from 1800 to 3200-rpm. The ideal speed for the swivel chair operation is said to be 2400-rpm., although other polishing operations are also completed with the same equipment.

Either of two methods may be employed in this production setup. The rotating spindle that carries the brush can be mounted in a fixed stand and the chair base applied to it by hand, or the brush can be mounted on a flexible shaft or portable equipment and applied to the base which remains in a fixed position.

The new method is applicable to all types of chairs, including aluminum, although its largest use at present is on steel bases, and mostly for preparation of surfaces prior to painting.—C.O.R.

Peters-Dalton Moves

Peters-Dalton, Inc., manufacturer of spray booths and industrial equipment for removal of dust and fumes, announces that its plant and offices are moved from 625 E. Forest Ave. to 17900 Ryan Road (corner of Nevada and Ryan Road), Detroit, Mich. The new location affords the company expanded facilities to give increased service to the trade.

They Cut Down Accidents, Fires

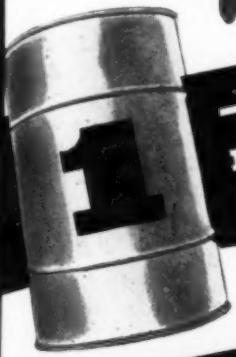
Safe practices, new protective devices, sound worker training, and efforts of the volunteer fire and safety group are credited for a 67% reduction in industrial accidents in Douglas Aircraft's Santa Monica plant in 1944.

The record low in accidents, only one-third that of 1943 and considered unparalleled in modern industrial history, was scored among an average 28,900 employes.

For every million man-hours worked there were less than five accidents. This compares with nine per million man-hours for the aircraft industry nationally.

There was not a single fire in the plant last year that went beyond the incipient stage, and no losses to report to the company's insuring agencies, thanks to the vigilance of the fire and safety volunteer group and employes' wholehearted cooperation.

A drum from Reliance is *Twice* filled!



1 —with the finishing material You Know is right for the job

2 —with Reliance's 25 years of practical and technical "know-how"!

Rely on Reliance

The same careful planning needed when industry converted to war production will be needed again when civilian production is given the green light—following Victory.

NOW is not too soon to be laying the groundwork for future finishing needs—Why not take advantage of the Reliance planning and engineering service which is at your command. Write us.

RELIANCE VARNISH COMPANY, Inc.

LOUISVILLE, KY. CHICAGO, ILL.

CONVECTION vs. RADIANT HEAT

Paint Curing Equipment

In this article the author gives one paint man's unbiased view of a somewhat controversial subject. He bases his opinions on his personal experience. This does not necessarily reflect the views of his firm or of this magazine. We will welcome comment from makers and users of paint baking equipment.

BY RUFUS J. FAIRBURN

AN INDUSTRIALIST is preparing a plant layout for the postwar production of electric refrigerators. He will need new ovens for curing the enamel finish. He wants to know whether to install radiant heat equipment, which he understands will permit very quick curing, or whether to install a convection oven.

Many other manufacturers have the same problem and may want to examine the factors that will influence a correct decision. There is a place in industry for radiant heat (near infra-red ray) equipment; and there is a place for convection (heated air currents) equipment.

In using the term "paint" in this article I mean any organic finish. It may be a synthetic-resin enamel, an oleoresinous enamel or varnish, a nitrocellulose lacquer or enamel, or any other coating used for protecting or decorating a manufactured article.

By "curing" I mean hardening the paint film and bringing out its best qualities. This may be driving out or evaporating solvents. It may be polymerizing a resin. It may be hastening the process of oxidation. Or it may be a combination of these methods of curing. Each type of coating has its characteristic way of curing.

Heat is What Cures (Dries and Hardens) a Baked Finish

There is no mysterious something that influences the curing of any paint. Heat brings about or hastens curing. Air change carries away paint vapors. The source of heat has nothing to do with the actual curing. The degree of temperature and uniformity of heat do influence the time required for satisfactory curing.

We see then that any oven that supplies adequate heat, for a proper length of time, and adequate air circulation, will cure any paint film.

If a paint manufacturer specifies a curing schedule of 300°F. for ½ hour, he means that the work must remain in that heat ½ hour after the oven has attained a 300°F. temperature. If 15 minutes in the oven elapse before this temperature is attained, the total oven time should be 45 minutes. A shorter oven time may result in only a partially cured finish.

It will be seen then that warm-up time is a factor. One oven may

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be so inefficient that 30 or 40 minutes are required to attain proper temperature. Another oven may attain the desired temperature within a few seconds.

A paint film, of the baking type, will not cure on cold metal. *The mass of metal must be heated to induce curing of the paint. Therefore the thickness of the metal and total mass of metal in an oven load will influence the time required for satisfactory curing.*

Formulation of Paint Influences Its Curing

It is the nature of some paints to require a fairly long curing time. Other paints may be cured in a very short time. Some paints will cure in a short time at low temperatures; others require much higher temperatures for quick baking. The point I want to make is this: Be very sure that the paint you expect to use is adapted to quick baking before planning a quick bake.

I have seen photographs of army tanks, jeeps and like equipment being driven through heated tunnels. The caption states that the paint is being baked in 2 or 3 minutes. Investigation will show that a baking type of paint is not being used. The finish will air dry if given sufficient time. To facilitate production a drying tunnel is used to surface dry the finish "dust free" or "tack free" in a shorter time.

With these facts in mind, let us consider different types of baking equipment:

Radiant Heat Ovens; Near Infra-Red Rays

Radiation is the process by which energy is propagated through space. For purposes of this article it is energy derived from near infra-red rays. Such rays are emitted by the flame of a match, by the sun, or by an ordinary light bulb. These rays do not create heat energy until they come in contact with a solid body—such, for instance, as a painted metal surface.

This method of supplying heat energy for the curing of paint films became popular, shortly before the war. A special light bulb is used as the infra-red ray source. A specially shaped reflector is used to direct the ray in the desired manner. (Gas or oil infra-red ray will be discussed further along in this article.)

It was originally thought that infra-red rays had some catalytic effect on paints, thus inducing a quicker cure. This has not been proved, however, and it is now thought that a quicker cure is had because of the elimination of a long warm-up time and because a quick-curing type of paint is used.

The Case of Thin Metal Painted on Both Sides

By experience we know that a thin sheet of steel may be painted on both sides and only one side exposed to infra-red rays. Both sides will cure equally. It must be concluded from this that it is only heat, applied through the paint to the metal, that cures the paint on both sides of the piece.

It has been suggested that convection heat will caseharden the paint film before a cure has been effected. In some cases this is true. This condition can be corrected by adjusting the paint formula so that the film will not skin over until it has bottom dried. This should be accomplished without lengthening total bake time.

As stated previously, an ordinary incandescent lamp will sup-

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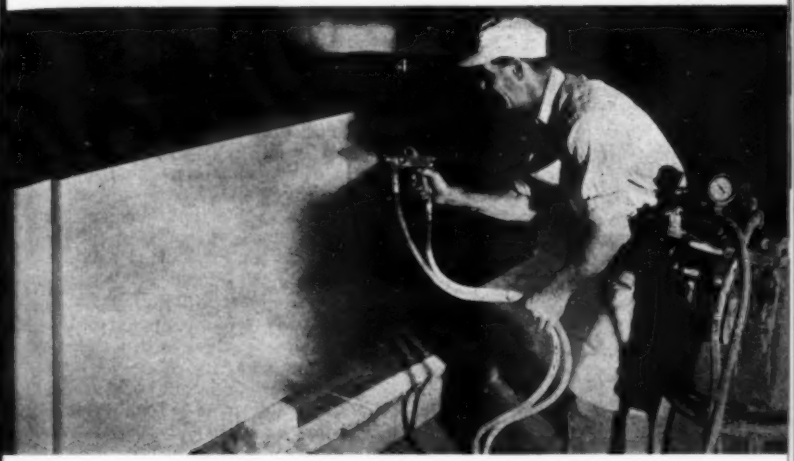

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ply radiant heat energy. The filament construction is such that more electric power is required than with lamps made especially for heat purposes. The average life of an ordinary light bulb is about 1000 hours. Radiant heat lamps are efficient 10 to 15 times longer.

Radiant heat lamps are available in different wattage. If, for instance, an installation of 250-watt lamps is made, it is possible to get higher temperatures from the same installation by changing to lamps of higher wattage. The power line must, of course, be such that higher wattage is permissible.

Reflectors for Lamps Are Important Too

The purpose of the reflector is to direct the infra-red ray. A wide reflector will spread the ray over a wide area, making fewer lamps necessary. A narrower reflector will concentrate the ray and give a more intense heat. For instance a 250-watt lamp, with a 12-in. diameter reflector (gold plated) should give about 1.2-watts per square inch. The same bulb with an 8-in. reflector will give about 2.2-watts per square inch.

Because of its high cost and unavailability, gold plate is seldom used for reflectors. It is probably the most efficient reflector, however. Copper, silver and nickel are sometimes used, but they oxidize rapidly and lose some of their efficiency. Polished aluminum or an aluminum alloy has a lower reflectance quality but is frequently used because it retains its efficiency for a longer time.

Solvent vapors and dust impair the efficiency of reflectors. For this reason they need periodic cleaning and polishing. Care must be used to avoid scratching the surface as a scratched reflector has lost some of its efficiency. Only very soft polishing cloth should be used. The polish must be free of grit and abrasive. Rouge, such as is used for polishing glass, is a satisfactory polish.

The reflectors should be so placed that the ray will impinge directly upon the work. There must be no shadows. Shaded areas are not being cured unless the metal is so thin that sufficient heat is conducted through it to cure the paint on the shaded areas.

Reflectors should be a uniform distance from all areas of the work. If some lamps are closer than others these areas will be hotter and a uniform cure will not be obtained. For this reason lamps are usually mounted in a tunnel. The work is usually about 11-in. from the lamp. If the tunnel is set up for work of one size and shape, it must be re-adjusted for work of a different size and shape. Otherwise lamp distance and ray direction may vary too much for uniform curing.

Enclosing Banks of Lamps with Insulated Walls

It is sometimes desirable to enclose the bank or tunnel of lamps. This will utilize heat which otherwise would be dissipated into the surrounding atmosphere. When this is done, the oven becomes a combination of radiant heat and convection.

Circumstances will suggest whether such an enclosure needs to be insulated against heat loss. If the oven is operated intermittently for short periods, the cost of insulation or the cost of an enclosure may not be warranted.

Oven size will usually determine whether an air circulating system is needed to insure uniform tem-

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perature within the oven. If the tunnel is more than a few inches deep it will surely be hotter in the upper strata of air, unless there is a circulating system.

One advantage of enclosing the bank of lamps is that then a means may be provided for expelling paint fumes. With an open bank of lamps, paint fumes spread into adjacent atmosphere. It is conceivable that these fumes may constitute a fire hazard.

Convection Type Ovens Heated by Gas or Oil

The convection-type oven, heated by gas or oil, is the same in principle as the one in your kitchen stove. The air is heated by means of burners within or outside the oven. Heated air currents bathe painted work placed within the oven and heat the metal, thus inducing paint cure. Gas or oil is generally used as the fuel.

Unless such ovens are insulated, much heat may be wasted. Most ovens are of such size that an air-circulating system is needed to insure uniform temperature in all parts of the oven. Within the past few years great progress has been made in the development of automatic heat controls. The control may be set to any desired temperature and the oven will automatically attain and maintain this temperature.

Warm-up Time May Be Long or Short

With a proper air-circulating system, adequate heat source, adequate insulation, and proper heat control, a convection oven may very nearly equal a radiant heat oven in minimum warm-up time. If this is a box-type oven much heat may be lost when the door is opened to unload and reload the oven. Even so, the warm-up time may be no more than 5 or 10 minutes with a modern oven.

Many very old and poorly engineered convection ovens are still in operation. When such an oven is compared with a modern oven, the contrast is startling. If the modern oven happens to be of the radiant-heat type, a misconception may be had of the relative merits of the two types of equipment.

Convection ovens are usually of such proportions that work of nearly any size and shape may be baked in them. This obviates any adjustment of equipment. The baking schedules may be varied by merely lowering or raising the temperature and leaving the work in a longer or shorter time.

Since gas or oil is usually much lower in cost than electric current, a convection oven may be operated, usually, at much lower cost than a radiant-heat oven. With no reflectors to polish and no lamps to replace, the convection oven may be maintained at lower cost.

Radiant Heat with Gas or Oil Fired Ovens

Gas or oil burners may be so placed that near infra-red rays are provided for curing paint films. Unless distance from work and direction of ray is as rigid as described for electric ovens, these ovens do not cure by radiant heat. If, as is usual, these ovens are patterned after the regular convection oven they are at best a combination radiant heat and convection oven.

Some of these burners are more efficient than some of the older type burners. In this case they consume less fuel with resultant economy. In some cases the burners are so distributed that very uniform heat distribution is pro-

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vided. It is possible to accomplish equal heat uniformity with a modern air-circulating system.

These ovens have flame deflectors that sometimes need to be replaced due to breakage; particularly if they are made of fire clay. Otherwise, maintenance is no more costly than with any type of convection oven. If many burners are used, installation cost may be higher than with some types of convection equipment. This cost may be offset by a lower operating cost.

Conclusion

1) What is relative installation cost? The convection oven will cost considerably more unless the radiant-heat oven is enclosed and insulated.

2) What is relative operating cost for short periods or intermittant operation? The radiant-heat oven might be more economical. Unless a convection oven does have a very quick warm-up time, it might have to be heated constantly regardless of whether there is an oven load.

3) What is relative operating cost for continuous operation? Since gas or oil is usually a cheaper fuel, the convection oven should be cheaper.

4) Which is cheapest oven for a temporary installation? Probably the radiant heat—unless it needs to be enclosed and insulated. Here, again, operating cost must be considered.

5) Which has lowest maintenance cost? Convection.

6) Which is the most desirable oven for a box, such as a refrigerator cabinet? Convection. A radiant-heat oven can have reflectors so placed that two sides, top and bottom of box will be cured as work passes through a tunnel. But the infra-red rays can not impinge directly on front and back of work, and this will result in underbaking these surfaces.

7) Which is best for bicycle frames, bird cages and like objects that offer small surfaces to infra-red rays? Convection. Infra-red rays create energy only when they impinge upon a solid body. With work of this character too much electric energy is wasted.

8) Which is the best oven for spot baking, such as patching? Radiant heat. A single reflector or portable bank of reflectors may be moved for baking small areas.

9) Which is the best oven for baking flat sheets? The radiant heat oven attains maximum efficiency here, as all rays are utilized. If, however, this is a continuous operation, fuel cost must be considered.

10) Which is best oven for varying sizes? Convection.

11) Which oven is best for wrinkle finishes? Convection. This is an oxidizing-type of paint that does not lend itself to quick curing. Furthermore it must be applied in a fairly heavy film and this, too, requires a longer bake.

12) Which oven is more desirable when different types of paint are to be cured in the same equipment? Convection.

Recapitulation

These, then, are factors that will influence a selection of oven type: Installation cost; operation cost; maintenance cost; shape of piece; weight or thickness of metal; cost of fuel available; number of shapes and sizes to be baked in same equipment; can a quick-drying type paint be used? Will more than one bake schedule be needed? Can the work be sprayed or dipped quickly enough to warrant a very fast schedule?

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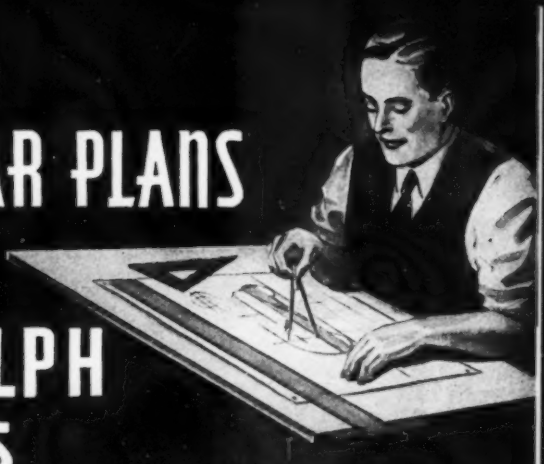

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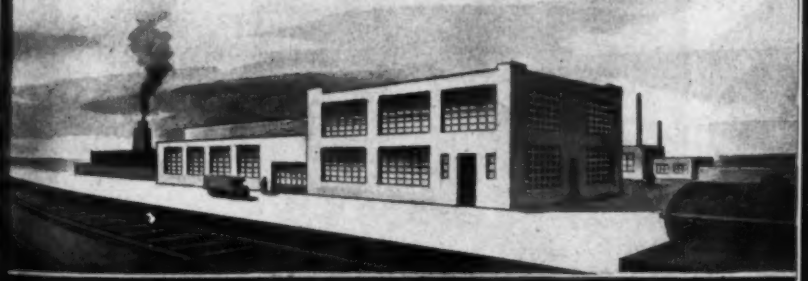

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Tooling up Small Shop for War Painting Job

BY BRAMWELL SIMPSON

We had to resort to the use of some makeshift equipment and unorthodox practices. We encountered many difficulties but we solved all of them and completed our war-production contract on schedule time, and our work was acceptable.

AT VARIOUS times during war, small factories and shops have faced the alternative of converting to war production or closing their doors. Some of these establishments were fortunate in being able to get into something closely related to their former work. Others got into the manufacture of products that were entirely different from anything they had made before the war.

We have a lot to be thankful for in the splendid cooperation extended by the management of these smaller firms, and in their ability to overcome numerous obstacles with which they came in contact. They found it difficult if not impossible to obtain certain equipment; they had to contend with a shortage of skilled labor; and they had difficulty getting raw materials into their plants, even with the highest priorities.

I was called in by one company, The Overhead Door Co. of N. Y. Inc., Cortland, N. Y., which was faced with such a problem. This company had received an order for several thousand wooden lockers measuring 2x3x6-ft., for a naval base. These lockers had to be delivered within six months. They had to be made of fir plywood and finished in a semi-gloss olive-green enamel, to the satisfaction of the United States Navy.

The company had no facilities for finishing the lockers. Its problem was to lay out a complete finishing department in the space available—one room, formerly the shipping room, 39x52-ft. This space had to serve as a combined finishing, storage and shipping room.

Selecting Materials and Working Out Schedules

Our first job was to decide on the material to be used and how many operations would be necessary to give a satisfactory job. We asked various paint manufacturers to submit samples of sealers, surfacers and enamel. When sample materials were obtained we tried them out on 1-ft. squares of fir plywood. Because of limited space, we could allow only three hours in which to apply the undercoats and finish coats, before placing the lockers on the floor for overnight drying and shipping next day.

We ran into our first trouble with the sealers, owing to the fact that we could not raise the temperature of the finishing room above 60°F. The sealers we tried would not dry fast enough or hard

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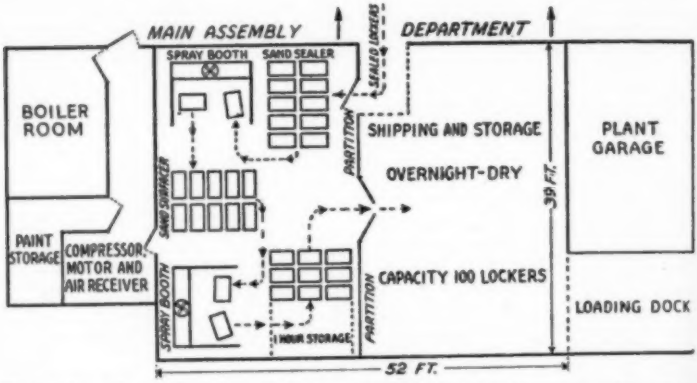

Floor plan of our 39x52-ft. finishing, sanding and drying room—with other rooms adjoining. Arrows show the direction of movement of work in process.

enough to sand in one hour—not unless we sacrificed adhesion for speed. Finally we overcame this obstacle by brushing on a lacquer sealer at the end of the locker assembly line, which was in an adjoining room where we had more heat. We used 4-in. brushes and a penetrating sealer with a hard resin base which we thinned with a non-grain-raising solvent. It was a "makeshift" but it worked for us.

Our next problem was the application of surfacer. Here again temperature caused us real trouble, as this operation had to be taken care of in the finishing room. We tried spraying two heavy coats of surfacer, but only succeeded in raising the grain of the wood, getting unsatisfactory drying, and pinholes. Then we tried one light coat and one medium coat of surfacer. This resulted in fewer pinholes and less grain raising, but still it was unsatisfactory.

Finally we reduced our surfacer with the same solvent that we had used in our sealer, and sprayed on light coats at intervals of five minutes. This took care of the pinhole trouble and excessive grain-raising; and the surfacer dried very nicely, leaving a fuzz on the wood which was easily removed by light sanding with No. 320 sandpaper.

Now we were in position to go ahead with our finishing coats. For this we used a synthetic enamel with an alkyd-resin base, spraying on a mist coat followed by a full wet coat. This gave us a smooth finish with the necessary sheen.

Laying Out Spray Room; Getting Equipment Ready

Our next job was to lay out the spray room in accordance with the schedule and finishing system we had developed. The available space, as mentioned before, was only 39x52-ft. We built a wooden partition across the room, extending it up two thirds of the height of the ceiling. Then we built a light frame from the top of the partition to the ceiling and stretched fine wire mesh across it. This was done to keep our spray room free from dust and still allow

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enough air to come in to operate our spray booth exhaust efficiently.

It wasn't too difficult to get spray booths, guns, pressure containers, transformers, etc., but a compressor and motor large enough to supply three and sometimes four spray guns posed quite a problem. After a week of frenzied telephone calling and inspecting old broken down compressors, air storage tanks and motors, we located an old 100-cu.ft. compressor which needed repacking and overhauling. We managed to find a usable storage tank and an old 10-hp. motor, These we turned over to the maintenance engineer, who worked night and day getting them into condition for operation. Everyone worked night and day, erecting spray booths, running air lines and sprinklers.

We placed our spray booths in position as indicated in the accompanying floor plan. They were placed to allow drying and sanding time of at least three hours.

For moving the lockers around in the finishing room we made special dollies (low wheeled small trucks), a locker to each dolly. Lockers were placed on the dollies in the assembly room.

The sealer coat was applied at the end of the assembly line, after which the lockers were rolled into the finishing room. They were lightly sanded and then rolled into the surfacer booth.

Moving Lockers on Dollies; Low Turntables in Booths

Here again we ran into trouble on surfacer application. We had made the dollies with swivel wheels on both ends in order to easily revolve them in the booth while spraying the surfacer. We had planned to spray one light coat on the outside, followed by another coat, but we found there was not enough drying time between coats. Each spray booth was large enough to accommodate two units, but the space did not give enough clearance to allow for the uneven circling of the dollies. This meant that we would have to put in turntables.

Because of the limited time we decided to make our own turntables. It was just a case of one thing leading to another. We were hurdling one obstacle after another and working feverishly to get into production.

For each turntable we took two ¼-in. metal plates 12x36-in., welded them together to make 24x36-in., and then welded the end of a short 1-in. diameter shaft to the underside of each table. In order to keep the smooth level top of each turntable close to the floor, and yet permit it to revolve freely, we placed two ball bearings below the floor to receive the short shaft (see illustration).

Cross-section of our ball-bearing turntable which is near floor level.

Each turntable had a clearance of 1½-in. above the floor. Then we built small steel ramps up to each table, using 1-in. angle irons as guides for the dollies. We also put angle irons across the top of the table, with a piece at right angles to the guide rails for a stop, and a catch to hold the dollies firmly centered on the table.

Surfacer and Finish Coats; Spraying, Drying, Sanding

Having two units in the spray booth at the same time, one man could spray surfacer on both cabinets, first coating one unit and then the other, following up with the

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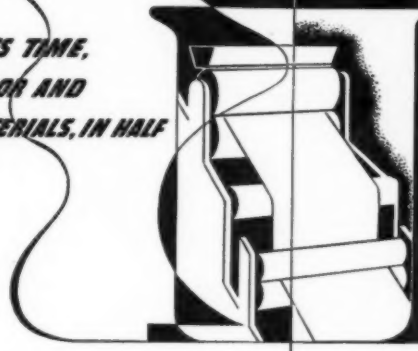

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second coats in succession. We could surface ten units an hour by this system, and get a good uniform coat of surfacer on each, with ample setting time between coats. The lockers were then rolled off the tables to the sanding space between the two booths where two men hand-sanded the surfacer with No. 320 sandpaper.

We did the same thing with the finishing booth that we had done with the surfacer booth, except that we installed a partition between the two turntables in order to prevent overspray, as we had two operators in the same booth spraying olive-green enamel.

How We Met and Solved Temperature Troubles

Temperature gave us trouble here too. Reducing the enamel according to the manufacturer's instructions, we got a lot of orange peel. When we tried to put on more material to get "flow", we got sags. We ordered the men to mix the paint and thinner in the proportion of 3 to 2 instead of 4 to 1, as advised by the manufacturer. We sprayed a light coat on the outside; then we sprayed the inside of the locker. Then the operator would spray the outside again with two medium coats. The only result of this, was a waste of labor and a flat sandy-looking job.

After more experimenting we decided we would have to raise the temperature of the material in some way. The boiler room was separated from the finishing room by a steel safety door, and we found there was some spare space in this room (the boiler room). Accordingly, we partitioned off a small portion of the boiler room and stored our material there (see floor plan.) This kept the temperature of our paint around 75°F. We were using 5-gallon pressure containers, so all the men had to do was to take their empty containers into the next room and come back with paint at the correct temperature. One container supplied enough material for spraying about six lockers.

When we really got into fast production, one man was kept busy drawing and mixing material for both the surfacing and finishing spray booths; he also loaded and unloaded the pressure pots while the operators washed their spray guns. It was necessary to clean the spray guns, as spraying the inside of the lockers covered the guns with material.

Getting a Dust-Free Finish; Paint Job Was Acceptable

We had a little more trouble with sanding dust and found it advisable to thoroughly blow out the locker inside and outside when it was in the booth, after tack-ragging. The lockers were then rolled out of the booth and left in the finishing room long enough to set dust free. They were then rolled into the shipping room, where the paint coating dried overnight. They were shipped out by trucks next morning.

We were a little apprehensive over the first few lockers, being afraid that the paint would not dry hard enough overnight to pack. Our paint manufacturer had been advised of this condition and did an excellent job on the formulation of material that was supplied for our work. We succeeded in filling our order in the specified time, finishing as many as 100 lockers a day.

I know that this is only one of many examples of the cooperation of business management, but I was very proud to have had a part in this interesting and successful experience.

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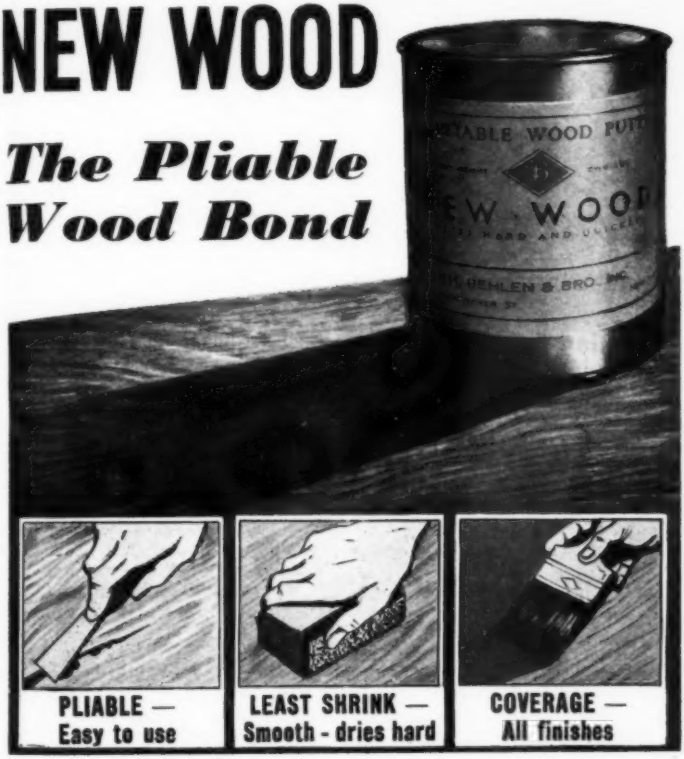

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Questions and Answers

Planning Schedules for Postwar Radio Cabinets

We are planning to install a production line finishing plant in connection with the cabinet plant we have here on the Pacific Coast. Our production will be confined, in this particular plant, to the manufacture of table-model radio cabinets only. This will be a postwar project.

Our contracts with the Army and Navy now call for fungus-proofing of all equipment, and it will be our objective to use these facilities and part of the equipment on war contracts for this purpose. In this connection, we are analyzing the department and the equipment we plan to install from the standpoint of the postwar problem, as we are certain that we can adapt it to its present needs without upsetting either program.

Thinking now of the postwar problem, what we have in mind is to set up a fast moving line that will have a capacity of finishing 500 units a day, with about a 2-hour cycle.

We have read some issues of this magazine and in them have found several interesting articles along this line, some of which involve the use of conveyor systems, forced drying of fillers, sealers and lacquers, and we are wondering if you would have a suggestion as to whom we might contact to get some practical engineering help?

We might further advise that we have already contacted several finishing material suppliers here on the coast, all of whom are substantial and reliable. We have also talked to respresentatives of leading spray equipment concerns.

In fact, we have a blueprint layout of our proposed plant, as furnished by one of these finishing material suppliers. In analyzing this, we find that their ideas are quite radical when compared with our prewar methods. For example, they recommend a combined stain and filler operation, followed by an immediate wiping of the filler and then drying in a 25-ft. tunnel heated by air that is to be driven in from a blower and gas furnace. The speed of the power conveyor which would carry the products is estimated at 4-ft. per minute.

We are giving you this much of the plan in order to show you what our thinking is; also, in order to make apparent where we might question the workability of such an installation. In short, we have access to some engineering help out here, but we feel that the setting up of a program such as this involves considerable responsibility and expenditure of money. Before we get into it too far we want to be sure it will work.

Our basic question is, how can we go about checking such a program so that we will have the right answers before we get in too deep? —X. Co.

WITH no information as to the type and amount of equipment you now have on hand and which you intend to salvage from your present war production, it is

REVEAL the beauty of your product to the fullest degree with a special finish designed for the sole purpose of making your product look as attractive and desirable as possible. Many artistic, practical finishing schemes for products of wood or metal have been conceived in our Creative Studio. We should welcome the opportunity to assist you in achieving the individuality and distinction your product deserves.

If present production is limited to war products, we are supplying protective coatings that meet all U. S. Government specifications.

In Teamwork with Quality

ROCKFORD VARNISH *Company*
ROCKFORD, ILLINOIS

Manufacturers of Protective and Decorative Coatings

hard to offer intelligent suggestions for your proposed postwar finishing department. You say you have in mind a 2-hour finishing cycle. I question the possibility of obtaining a good finish in two hours with any materials that are now available or which will be available soon after the war.

However, if your reliable supplier of finishing materials can guarantee to furnish materials that will produce a satisfactory finish within a 2-hour cycle, working under reasonable factory conditions, you can go ahead and plan your finishing schedule accordingly.

Plan for Future Expansion

One important thing to bear in mind is to plan a finishing department that will be adequate not only for your immediate production needs, but for your probable or possible future needs. This is especially true where a conveyorized finishing department is to be installed.

Many times a system is built to accommodate or handle so much volume, or a certain number of pieces a day. Then, when the manufacturer decides to increase his production, he discovers that he cannot handle any more goods on his present conveyor system setup without speeding up his conveyor, and this he cannot do because his drying ovens are built for a certain conveyor speed, and his work stations, spray booths, etc., are too close together for the new schedule. So he has to remodel his whole setup and enlarge his buildings at considerable expense in order to take care of his increased production.

For instance, if you build your system to handle 500 radio cabinets per day, how do you know but what in the near future you may want to build and put through 1000 cabinets a day? My advice is to build larger than your early postwar needs, as this will be much more economical than an expensive remodeling job later on—when the manufacturers' race for volume production and sales is really on.

As to the type of system most suited for your work, I would suggest an overhead type of conveyor equipped with hooks for hanging your cabinets to the chain. My suggestions as to the method of finishing and time required between operations, are as follows:

Stain-Washcoat; Force Dry

After careful inspection of clean cabinets, hang them to the conveyor chain and allow them to travel through a tank containing a combination stain and washcoat. This can be accomplished by having the conveyor monorail curved down and then back up again to allow the chain to carry cabinets through the tank. A drainboard at the exit end of the tank will catch surplus stain from cabinets and direct it back into the tank. Allow the stained washcoated cabinets to travel for 15 minutes through a hot air tunnel, with a heat of 125° to 135°F., and relative humidity of 15% to 20%. Then let them travel another 10 minutes through an air tunnel or other space at room temperature to cool.

Now the cabinets are ready for a light hand sanding with No. 5/0 or 6/0 sandpaper—depending on type of wood used, and possibly other conditions. Next, the conveyor will carry cabinets through a tank containing a filler that is formulated for dip-coat application. Naturally the filler in the tank must be kept agitated or stirred continuously to keep its solids in suspension in the liquid.

(Continued on page 100)

AMERICA'S FINEST

Padding Lacquer

TOUCHING-UP

RENOVATING

Qualasole can stand the "test" of either the factory mass production or the small home renovating job. Craftsmen and foremen alike, agree that Qualasole renews the rich qualities of wood, is easy to apply, is economical, quick drying, and durable—that Qualasole is superior when french polishing, padding, touching-up and renovating—on antiques, reproductions, modern or mass production. Being able to stand these "tests" has made Qualasole America's Finest Padding Lacquer.

QUALASOLE

21 GAY STREET NEW YORK 14, N. Y.

QUALATONE PRODUCTS, INCORPORATED

Apply Filler; Force Dry

Following this dip-filling operation, the cabinets will have to travel for some distance to allow time for the filler to "set"; then the surfaces must be wiped clean. Next the cabinets will enter a filler drying oven, wherein a heat of 150°F. or higher is maintained, depending on the type of glue used in the plywood or wood joinery. Some glues will break down under high temperatures and a relative humidity of 25% to 35%.

These cabinets, if filled with present (and I think the immediate postwar) filler, should travel for at least one hour in the filler oven. Then allow the cabinets to travel for 10 minutes through a cooling tunnel where fans will blow cool air over them to bring them back to room temperature. Next the cabinets must travel through a shading stain booth where a lacquer shading stain is sprayed on to uniform and blend in all off-color areas, sap stains, or streaks in the wood.

Sealer Coat; Finish Coat

In a sealer spray booth the cabinets are sprayed all over with lacquer sealer. Then three minutes of travel at room temperature allows the sealer to flow out to a uniform thickness coating. The drying calls for ten minutes of travel through a hot tunnel wherein the temperature is 120°F. and the humidity 15%. In this tunnel hot air is blown on the cabinets as they pass through. After leaving the hot air tunnel they move along under fans for five minutes where cool air is blown over them to cool the force-dried sealer coat. Then follows ten minutes for light hand sanding.

At the final spray booth the cabinets receive a coat of 27% solids lacquer, or some synthetic coating such as will be available and widely used after the war. Force-drying follows while the cabinets travel for 1 to 1½ hours (depending on type of materials used) through an oven wherein the temperature is 135° to 175° F., (again depending on type of materials used, as lacquer requires less time and less heat than synthetics), with a relative humidity of 30% to 35%. Then after leaving the baking oven the cabinets then pass through a cooling zone where cool air is blown over them to restore them to room temperature.

They are then removed from hooks on the conveyor, rubbed and polished and put in cartons for temporary storage or immediate shipment.

The plan I have given requires a finishing cycle of 3 to 3½ hours. This is based on types of materials which I think will be available immediately after the war. In my plans, I have not stated the speed of the conveyor because this will be determined by the distance between the cabinets after they are placed on the chain.—H. W. CHESTER.

FIVE HUNDRED units per day is a very small production of table-size radio cabinets, and when you mention a 2-hour cycle, that would mean you would only have to turn out about 50 to 60 cabinets an hour to get 500 cabinets per day. This means that you are probably too small to install any real production equipment such as conveyors, baking ovens and equipment that is designed to speed up the production schedule.

I don't know who the finishing supplier is . . . but I feel that he is not well qualified if he has recommended a combination stain and filler operation, followed by an immediate drying of the filler, and

BAKING ENAMELS
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WOOD and METAL
FINISHES

SYNTHETICS
VARNISHES
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FILLERS
STAINS
SUPPLIES

PROMPT SERVICE

Losses incurred in idle man hours and curtailed production schedules as a result of poor service and delayed shipments amounts to a staggering total in plants throughout the country.

The N. Y. W. S. Co. has built its business on the cornerstone of uniform and high quality products and prompt service to its customers. This means no delays in color matching, special formulations, nor in the shipments of any of the NEW PERIOD full line products and finishing supplies.

Eliminate costly delays and tieups. Use NEW PERIOD products plus prompt service to get what you want when you need it. Why not request samples of the products you need and learn first hand what prompt service means.

NEW PERIOD PRODUCTION FINISHES

NEW YORK WOODFINISHERS SUPPLY CO., INC.
109 IMLAY STREET BROOKLYN, N. Y.
Established 1917

then drying in a 25-ft. tunnel heated by air which is driven in from a blower and gas furnace, with the conveyor carrying the products at 4-ft. per minute. This would mean that the filler would only get six minutes in which to dry. There is a possibility that postwar fillers of a very special nature can be dried perfectly hard in six minutes, but a temperature of possibly 300°F. will be necessary to do this. Hot air blown in from a gas furnace will not be enough to dry filler in six minutes.

After the combination stain and filler operation, you will still need at least a coat of sealer and one or two coats of top-coat material. If you use lacquer finishing materials, it will take at least two hours to put on three coats and dry them, provided you do not rub or polish the last coat. It will take even longer if any rubbing operations are included.

To offset this lacquer finishing idea, there will undoubtedly be new types of synthetic varnishes available after the war. These will have a solid content high enough that one coat of the varnish over a coat of sealer will give more body than two coats of lacquer over a coat of sealer. The varnish will be of such a nature that it can be force-dried in an hour at 150°F., and can be rubbed and polished just as soon as it is cool; or, if there is any need for faster production, the temperature can be raised and the time reduced down to as low as five minutes, if the temperature is raised high enough.

You say that your basic question is how you can go about checking such a program so that you will have the right answers before you get in too deep. There is only one way that I know of to do this and that is to work closely with some one finishing house in which you have full confidence. By close cooperation and frequent consultations, an ideal, mutually satisfactory finishing schedule can be set up, and a finishing material house can then produce sample panels, etc., for this schedule. As objections or defects develop, the schedule can be modified to overcome them. Finally, when a satisfactory schedule has been devised, the question of equipment and the details of its arrangement can be worked out with the equipment people.—F.N.

I HAVE HAD extensive experience with high speed finishing of cabinets and chests and hope that I can be of assistance to you in planning this project.

In order to give you a complete plan, or to make a thorough study of the plan you are now considering, I will need more information than that contained in your letter to INDUSTRIAL FINISHING. I would need to know the floor area of the present or proposed finishing room, ceiling heights, etc. Also the approximate sizes and types of cabinets—plastic, metal, and if wood, whether veneered or solid.

If you are to finish plastic, metal and wood cabinets, perhaps a tunnel can be made to accommodate all three types.

If walnut and mahogany are to be used, the finishing procedure must include fillers, therefore the kilns or tunnels and heating method need careful consideration. Since laminated and solid wods, joined even with the most modern of glues, seldom withstand better than 140°F., and since temperatures of 140°F. and higher would probably cause pinholing in filled walnut and mahogany surfaces, I do not see how you can expect to produce a first quality finish when

Whatever you expect of postwar industrial synthetic coatings, expect it of Pratt & Lambert-Inc.

PRATT & LAMBERT-INC.
Industrial Finishes
NEW YORK BUFFALO CHICAGO
FORT ERIE, ONT.

the cases would remain in the tunnel for only 6¼ minutes. Temperatures were not stated in your letter, but apparently they were intended to be very high in order to accomplish thorough drying in that short length of time. Here lies some danger! Woods of this type require careful drying to avoid trapped solvents and subsequent pinholing and checking.

Am I correct in assuming that your war product to be fungus-proofed, is of the same general dimensions as the table model radios, and are your radio cabinets to be dipped?

Any other pertinent information you can provide will be useful in helping you plan your finishing room project.

Establishment of my color and process studio has been recently announced. If you have any problems in color-styling your postwar radios, I will be glad to serve you. —NORMAN H. VOIGT.

Letters from I. F. Readers

(Continued from page 12)

composition roller is passed over the surface to pick up the ink that remains on the plate, and then this roller is passed over the sheet metal to transfer the inked impression. Then the graining ink must dry, after which the surface is given a clear or transparent protective coating. Perhaps your mechanical facilities for performing this work need some improvement.

We are out of reprints or tear sheets of the many articles we have published about graining (reproduction of wood grain on metal sheets), but you might obtain something of interest and value by communicating with one or more of the concerns whose names we are sending you by letter.

Other methods of "graining" include silk-screen stenciling, the use of a pre-grained lacquer film, transferring the impression from graining paper, and the use of decals. Names of concerns to whom you can write for further information, supplies, materials and equipment, are being forwarded to you by letter.—ED.

Hot Lacquer Equipment

Please send names of manufacturers making "hot lacquer" spray equipment. We have a job of applying wax for moisture-proofing, and I think we could use hot lacquer equipment for it.—G.H.

Information by letter.—ED.

West Coast Flock

We note in your "Letters from Readers" that the Seattle office of a company styled as "Y" is interested in finding West Coast manufacturers of flock. We suggest that these people get in touch with Pacific Coast Sales Co., P.O. Box 5460, Metropolitan Station, Los Angeles 55, Calif., on flock or adhesives. These people handle the sales of our products on the West Coast, and can be of real service to the concern.—THE RAYON PROCESSING CO. OF R. I.

Flow Coating

We manufacture bedsprings and paint them by the dipping process. We would like to change our method of painting to flow coating. Would you please furnish us with the names of engineers or manufacturers of flow-coating equipment, that we could engage to design and lay out the proper application of flow coat to our product?—U.B. Co.

Information given.—ED.

Tumble Finishing

It was my good fortune to reread a copy of your publication dated Jan. 1934, where I came across an article by Mr. R. J. Fairburn, on tumble finishing. This interested me very much at this time, as I am looking for that very thing. I wish to know who sells the paint or lacquer for that purpose; who sells the tumblers, etc. At the time this article was written, it appears to me that Mr. Fairburn was employed by The Zapon-Brevolite Lacquer Co. Can you place me in touch with them?—B.H.T.

We understand you published an article on tumbling for the application of paint and lacquers to small parts. Would it be possible for us to receive a reprint of this?—T. Co.

Thank you for your letter to Mr. Angus S. Macdonald, with which you enclosed the article on tumble finishing. We are interested in finding out what firms handle the materials required for sanding, polishing, sealing,

Your Search for a Finish Ends Here

Our files of formulas have proved a boon to manufacturer after manufacturer in search of some elusive coating or other. Specify your need—we enjoy an enviable high batting average in producing finishes where others have failed.

Aircraft Finishes
Synthetic Adhesives
Zinc Chromate and Other Finishes
Strip Coating for Masking
Wrinkles
Surfacers
Water Dip Lacquers
Finishes for Metals and Plastics

SEA-LAC

DURALAC CHEMICAL CORPORATION

LISTER AVENUE, NEWARK 5, N. J.

waxing and finishing wooden articles in tumbling barrels. We are operating a farm woodworking shop, making toys, and would appreciate it if you could give us the names of some of these firms.—THE MACDONALD FARM.

Information supplied.—ED.

Dipping Machines

Can you inform us of any company that makes dipping machines? We are badly in need of these but have been unable to find a source of supply. —R. TACKLE CO.

Certain types of dipping machines are available; many others are not. We are sending you what information we have.—ED.

Gilders' Agates

One of our good customers has asked us to try to find out where they can obtain gilders' agates, which are agate tools used for burnishing gilding on picture frames and similar articles. We would appreciate any information that you have.—W. S. CO.

Information by letter.—ED.

Pearl Essence

We are in need of a source of supply for pearl essence. Could you recommend such a source that we might contact?—C.P. CO.

Information given.—ED.

Drum Rolling for Mixing

In your February 1943 issue, on page 32, there is an illustration on "Drum Roller for Mixing". It is advertised by the Vol-U-Meter Co., but it has no address. I am anxious to contact them and would appreciate your giving me their address, if you have it on file.—N.T. CO.

It is 73 Wilbury Place, Buffalo 16, N. Y.—ED.

Electro-Static Field

Sometime ago we read in one of the electrical publications a description of an article in which an electro-static field is used to more edequately cover objects being sprayed. The system was also used in detearing sprayed or dipped objects. It has been suggested that we contact you, with the hope that you may know something of the process. Any information you could give in the form of copies of an article or reference would be greatly appreciated.—A.O. CO.

Information supplied.—ED.

Zinc Chromate Primer

In two recent issues of your magazine, INDUSTRIAL FINISHING, there appeared articles on "The Theory and Use of Zinc Chromate Primers". This was of such interest to us that we would like to have 35 reprints of this literature, if possible. We are holding a technical conference soon and would like to have these reprints by that time.—F.S. CO.

Reprints supplied.—ED.

A B C Blocks

Please refer to page 5, of December issue of INDUSTRIAL FINISHING, under "Letters from Readers". You have a request entitled "ABC Blocks", signed "D. Co.". We are interested in obtaining the name and address of this company, as we can help them.—X. CO.

Information supplied.—ED.

New Products Available for Industry

Associated Engineering & Research Companies, Robert Wallach, Executive Director, an organization of inventors, engineers, research men and market analysts have established offices at 150 Broadway, New York 7, N. Y. They are ready to serve manufacturers seeking needed new products in the electro-mechanical field, and offer a wide range of items from internal combustion engines to household specialties.

In addition to providing the ideas, they are equipped to furnish working models, complete engineering drawings and a comprehensive market survey covering the products recommended. They will recommend one of their already developed products or devise a new product to meet particular specifications.

In either case the product must be one that can be profitably marketed; requires the minimum change in present plant and equipment; is within the range of the present "know how" of the production department and fits in with present sales set up and experience. They have available 80 new products either already developed or in process of development, the majority of which are patented or in the pending stage.

MONARCH

Lacquers for Industry

INDUSTRIAL CEMENTS

MONO-HES 1X90—Monarch's crystal clear plastic cement, formulated especially for industrial uses. The adhering qualities of 1X90 are well known to the shoe manufacturing trade, where proper leather to leather cementing is of the highest importance. Adaptable to leather to metal—leather to glass—glass to glass—metal to glass—felt to glass, felt to metal—felt to wood—wood to wood—wood to metal—cloth to wood—cloth to metal—cloth to glass, all plastics, etc. 1X90 is strong, dry-fast and dependable.

MONO-HES 1X88—Monarch's special lamp shade cement, formulated to do a specific job: Colorless, fast drying, and dependable 1X88 is another Monarch product designed for industry.

● Monarch's laboratory facilities will solve your cement problem—Write in detail for information concerning your particular problem.

MONARCH LACQUER CORPORATION

19 GAY ST., MANHATTAN 14, NEW YORK

Materials Supplies Equipment

High Pressure Degreasing and Cleaning Unit

Here is a compact portable unit that provides an emulsifying solution of uniform strength, delivered at 300-lbs. pressure at the nozzle in ample volume, for rapidly flushing away dirt and emulsified grease and oil. The Hydra Lectric unit may be used with either hot or cold water.

This method of cleaning provides the following features: 1) a grease-emulsifying chemical solution of uniformly controlled strength; 2) ample volume of water to rapidly flush away the loosened dirt; and 3) high pressure to increase flushing action and to drive cleaning solution into every crevice where dirt may collect.

For product or maintenance cleaning.

For heavily dirt-encrusted and carbonized surfaces the Hydra Lectric unit is designed to apply a pre-soak solvent oil which quickly loosens the toughest, "baked-on" layer of grease and dirt preparatory to hy-pressure cleaning.

The machine consists of three tanks, a 24-gallon tank containing the cleaning chemical in concentrated solution, a 5-gallon solution mixing tank, and a 34-gallon pre-soak solution tank. These tanks feed through a by-pass valve to a motor-driven high-pressure rotary pump. A steam coil is provided to heat the solution if steam (10-lbs.) is available; or, if hot water is available it may be directly connected to the unit. On cleaning jobs of many types cold water is entirely satisfactory.

The typhoon nozzle or gun is adjustable to deliver any volume from a fine mist to a solid stream, and the flow may be shut off entirely at the nozzle without shutting off the machine. When the nozzle is closed the solution under pressure simply circulates through a by-pass until the gun is again opened. A large clock-face diel shows the pressure at which machine is operating.

Hydra Lectric cleaning compounds contain nothing that will corrode or clog the pump and other parts of Hydra Lectric unit, and they are non-injurious to lacquer finishes, metal trim, or rubber. The cleaning compounds and cleaning equipment are manufactured by Hydra Lectric Products Corp., Indianapolis, Ind.

Coating Stands 2200° F.

According to literature sent out by the distributor, Geo. R. Mowat Co., 24 W. 40th St., New York 18, N. Y., Griffin's "Hytemp" Protective Coating resists extreme temperatures on refractory materials and on ferrous metal. Bonds firmly and protects against spalling (chipping, cracking, breaking from heat), oxidation, etc. Will not melt and "run."

Hytemp is a liquid of about the

"Oh, that department's been closed down ever since we started using WEAR MASTER Finishes!"

Wear Master Finishes Insure
COMPLETE CUSTOMER SATISFACTION

Even the most "finicky" buyers can't help but admire a genuine WEAR MASTER Finish. But complete satisfaction comes with the way WEAR MASTER Finishes stand up . . with the longer life of protection and beauty they give your product.

Give your dealers this important safeguard against complaints due to inferior finishes. Change now to WEAR MASTER Finishes . . as easy to work with as they are to look at.

STANDARD INDUSTRIAL PRODUCTS, INC.

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Now—Try Famous S-I-P CLEEN-UP POLISH Free!

For all fine furniture finishes. Removes dust, lint, finger marks, rubbing compound. Leaves no film! Works faster, goes farther!

Just clip this ad to your letterhead and mail in for a generous trial SAMPLE of *S-I-P Cleen-Up Polish*. No obligation.

EVANSVILLE 4, INDIANA

consistency of calcimine. It is composed of several mineral substances of which chromic oxide is the base, processed to bond firmly when "set" by heat. The green color is characteristic and does not change under the action of high temperatures.

It is applied by brush, spray or by dipping—and after being given a thermal set, bonds with and becomes part of the surface to which it is applied. It is not affected by moisture or any drastic changes of temperature, nor by varying degrees of expansion and contraction when used on refractory material or ferrous metal.

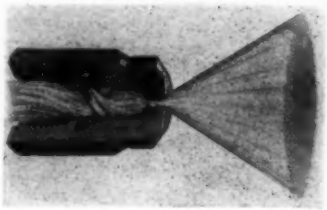
Stop-Off Lacquer

Korolac RX solution, used in covering plating racks either by itself or with Koroseal Tape RX, is now being made in white instead of the clear color originally furnished. Used as a stop-off lacquer, the white is clearly visible and the operator has no difficulty in determining just what portions of a part have been masked. When covering new plating racks the white solution shows plainly whether all parts of the rack have been covered.

The new white Korolac RX has the same chemical resistant properties as the clear type and gives a slightly heavier coat per dip. It provides a corrosion resistant, tough, inert coating with good insulating properties. Liquid at room temperature, it holds its position on the rack, after dipping or painting, because of shrinkage as the solvent evaporates. This material is a product of B. F. Goodrich Co., Akron, Ohio.

Corrosion Resistant Spray Nozzles

For chemical processes where corrosive liquids are handled, the "Fulljet" spray nozzle typifies a complete line of suitable spray nozzles made by Spraying Systems Co., 4017 W. Lake St., Chicago, Ill. The "Fulljet" nozzle is made of hard rubber



For spraying corrosive liquids.

with removable internal vanes. It sprays acids and other corrosive liquids to form a full cone spray pattern with uniform distribution. Degree of atomization of the liquid sprayed depends on nozzle capacity and pressure used.

Spraying Systems nozzles for corrosive liquids are built to perform to exacting specifications. For any given liquid pressure, they spray at predetermined capacities and rates of flow as well as at specific spray angles. In this way, the various sizes and types of these corrosion resistant nozzles meet the exacting needs of practically any process. "Fulljet" nozzles are also available in lead or plastics.

Rubber Cement Makes Anything Stick

A new rubber cement, named Plastilock 500, a non-thermoplastic, water and aromatic oil-resistant adhesive for bonding metals, wood, plastics and ceramic material to themselves or to each other is announced by The B. F. Goodrich Co., Akron, Ohio. The company claims it provides superior bonding qualities in any of its applications, and in some cases can be used in place of rivets or screws.

In using Plastilock 500, the company advises that best results are gained by applying heat with pressure, although heating alone will give some degree of adhesion. Purpose of the pressure is to obtain good surface contact. The bond strength varies with the materials being adhered.

AND TOMORROW'S
PRODUCTS
FOR PEACE...

EGYPTIAN *Finishes*

Today most of Egyptian's wide range of finishes is devoted to the war . . . high quality finishes for war material used in the war or related to it.

Through the war years Egyptian has steadily maintained the reputation for quality which has marked Egyptian products for over half a century. You can depend upon Egyptian for the finest finishes obtainable . . . for the war materials you are making today; for the post-war products you will make tomorrow.

Inquiries concerning your present and future finish needs are invited.

THE EGYPTIAN LACQUER MANUFACTURING COMPANY
ROCKEFELLER CENTER, NEW YORK 20, N. Y.

EGYPTIAN FINISHES

EGYPTIAN
SPECIALIZED PRODUCTION FINISHES

Waterproofing Liquid

Guaranteed Products of 1117 Crenshaw Blvd., Los Angeles, Calif., claims that its new product "Creto" will waterproof any masonry, inside or outside, with one application, either to a painted or unpainted surface, whether applied inside or outside, even if the brick or stucco or concrete is wet when "Creto" is applied.

The chemical changes component parts of masonry into one single solid mass, preserves, stops seepage and locks in alkali and lime in event the concrete is to be painted; also that the paint will not peel or crack if "Creto" is applied first.

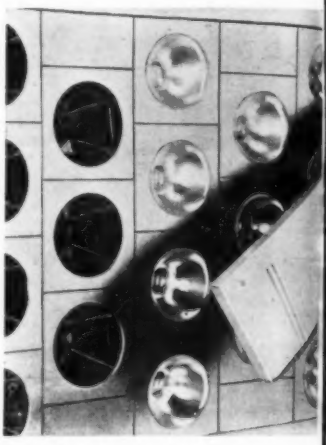
"Logan" Sure-Flow Pumps

An improved line of centrifugal pumps, including 27 different sizes and types, and designated as "Logan" Sure-Flow Pumps, is announced by Logansport Machine Co., Inc., Logansport, Ind. Although the "Logan" pumps are designed especially for pumping coolants and cutting oils, they are adaptable for circulating cooling liquids, pumping or circulating water or quenching oil and general liquid transfer service. Foot-mounted, bracket-mounted, flange-mounted, grinder and submerged types are available.

One of the features of "Logan" Sure-Flow Pumps, which guarantees maximum pumping efficiency, is the open impeller. It eliminates the need for close clearances or metal-to-metal contact of running parts and, thus, allows pumping of liquids containing some abrasives and other foreign matter without damage to the pump.

Staggered Arrangement for Infra-Red Lamps

"Nest of heat" method of spacing R-40 reflector lamps in infra-red ovens that assures both full and even coverage of the article being baked, is announced by Jensen Specialties, Inc., 9331 Freeland Ave., Detroit 27, Mich., manufacturer of Jensen "Dual-heat" Infra-Red Ovens.



Example of staggered arrangement.

This method, whereby the lamps are staggered rather than aligned, gives an over-all distribution of infra-red rays. Particularly significant in connection with baking white paint and pastels, it prevents possible discoloration of the part by banishing the danger of overbaking certain areas while underbaking others. It ends the familiar problem of getting undesired stripes of alternate darks and lights.

"Nesting" is achieved by advancing the lamps in each row a quarter step or more beyond the lamps in the preceding row, according to the requirements of the job. Blank spaces are thus eliminated and full, even coverage is assured.

Vehicle for Aluminum

Monon Resins & Chemicals, 1325 Summer St., Hammond, Ind., announces a product called "Monex", which is especially suitable as a vehicle for aluminum paints. It is a non-oxidizing plastic coating that is highly resistant to salt air, brine, moisture, petroleum oils and greases, weathering, etc. Monex air-dries or bakes. It can be baked on new galvanized metal without a prime coat.

...ICKS CORROSION

COREX is an organic finish applied to metal by dip or spray, giving it an enduring protective armor against corrosion by acids, salt spray, humidity, steam and other demons of destruction.

Products coated with COREX have been subjected to corrosive liquids and fumes without deterioration for over 10,000 hours—more than a year.

Available clear and in colors for industrial applications.

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STANDARD VARNISH WORKS

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Engineers of Product Finishes

Industrial FINISHING

Distributed monthly to finishing room and paint shop foremen, production superintendents and company officials of metal-working, woodworking and miscellaneous industrial plants where production cleaning and finishing are major operations in parts and products manufacture.

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Editorial

Radio May Dry Paint

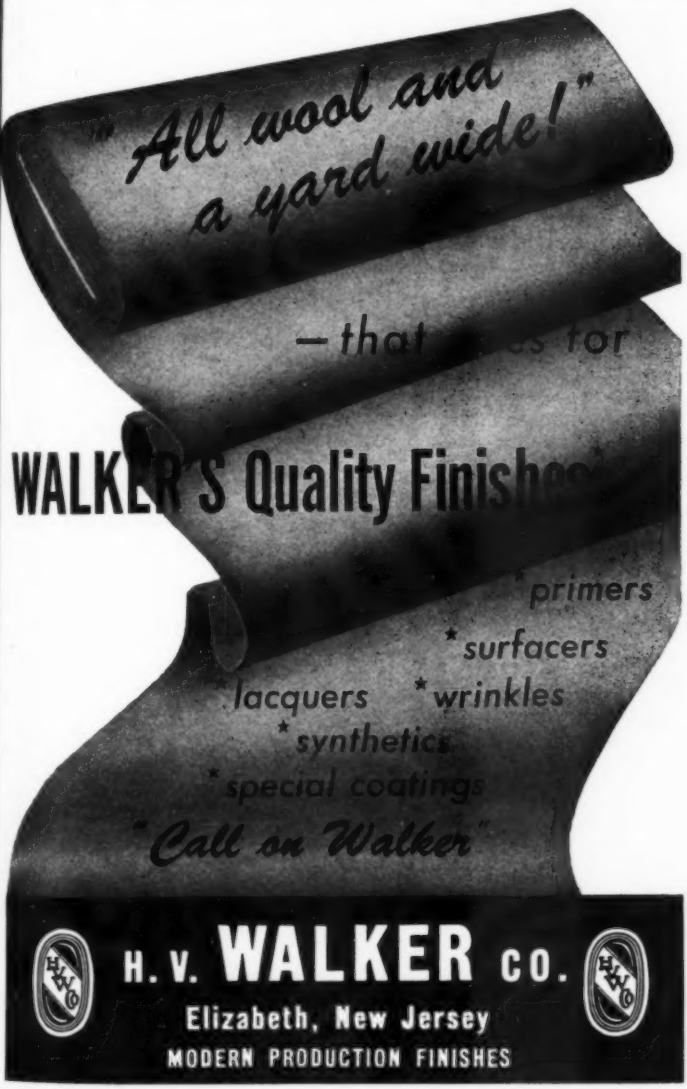
Ordinarily we think of radio as wireless communication whereby messages, audible entertainment and other sound effects are transmitted and received over considerable distances through the air, or rather through the ether. But radio's high frequencies are being put to many other and radically different uses in war and civilian industry; for instance, curing plastics, kiln-drying lumber, bonding plywood, and perhaps for drying and baking paint coatings.

So many industrial applications and possibilities have developed along this line that Westinghouse Electric & Mfg. Co. has created an Industrial Electronics Division to take care of the rapidly expanding functions of radio in industry.

Why the Paint on War Products Peeled Off

A U. S. Army officer who returned to the states after inspecting new shipments of various kinds of ordnance materiel and equipment in the Pacific area disclosed the fact that while the paint coatings on some materiel held up fairly well, the paint on others peeled badly and had to be scraped off for recoating at field shops. This is unfortunate to say the least. It is discouraging to the men to receive ammunition and equipment in this condition. This scraping off of paint and repainting involves extra time and expense, and it requires overseas manpower that could be profitably employed on other work.

The paint on 155-mm. projectiles that came in one shipment peeled from about 90% of the surfaces coated, thus leaving the bare metal unprotected and subject to rapid and destructive rusting. Since the same specification coating was used on other propectiles which did not peel, the Army officer believes that the fault lay, not in the painting but in the metal cleaning job. It was evidently inadequate or unsatisfactory in some respect. Here is a common fault, even in civilian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MODERN PRODUCTION FINISHES

product painting: Surface preparation isn't thorough or adequate.

Of course, there are other possible causes for lack of adhesion between a paint film and the metal surface to which it is applied; for example, temperature extremes (metal being too hot or too cold when painted), improperly prepared paint (as to viscosity, mixture, etc.), incorrect technique in applying the paint; oil or moisture in the airlines, etc. Sometimes this highly essential work of surface preparation is supervised and executed with indifference, carelessness or ignorance. The observance of correct practices, pride of workmanship, care, and thoroughness in all details—these are sometimes thrown to the winds in one sickening orgy of, "slap it on and let it go; it will all be destroyed anyway."

It is hoped that more real care and intelligence will be exercised in the preparation of surfaces and the painting of all future shells and equipment to be sent to the armed forces. Excellence in the quality of ammunition and equipment, including the coatings on same, will materially help our boys to conquer the enemy and return home to civilian life.

More Tractors to Paint

The production of all types of tractors showed a large increase during 1944, according to the U. S. Department of Commerce. The production of wheel-type tractors, which are the type principally used on farms, more than doubled from 1943 to 1944, increasing from 105,248 in 1943 to 247,376 in 1944. There was a 52% increase in the number of tracklaying tractors produced, from 29,453 in 1943 to 44,760 in 1944. Approximately 17,000 garden tractors were manufactured during 1944, an increase of 93% over the 8788 made in 1943.

Combines and grain threshers were also produced in increased numbers during 1944. The 44,681 combines, harvester-threshers, produced in 1944 represented a 53% increase over the 29,219 produced in 1943. Approximately a twofold increase was shown in the number of grain threshers manufactured, from 668 in 1943 to 1851 in 1944.

These statistics were compiled from reports submitted by 45 manufacturers with 53 plants.

Furniture Varnishes; Thin Films to Dry

★ A few years back China wood oil, or tung oil, was practically the only drying oil used in furniture varnishes. Other oils were used to a limited extent, but China wood oil comprised 80% to 100% of the oil in most formulations. During those days it was customary in the average furniture factory, especially if only one coat of varnish was used, to coat the tops quite heavily. Bed ends were varnished in this manner and laid down flat to prevent the varnish from running off. While this practice sometimes caused checking, cracking, printing and other troubles, the average finisher knew he could rely on the varnish to dry hard eventu-

★ Guest Editorial . . . Many readers can write an excellent editorial — two or three paragraphs that present a timely suggestion or valuable idea which will stimulate real thought on a live subject. The Editor welcomes guest editorials and pays for those that are published.

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INDUSTRIAL FINISHES

SINCE 1875

NOT THE MOST – JUST THE BEST

ally. If it was not dry the following day, it would certainly be hard in an extra day or two.

In the past four or five years it has become necessary to eliminate china wood oil in practically all formulations because its use was restricted by the demands of the war. The varnish chemist, in collaboration with the oil technologist, was forced to replace China wood oil with other less critical drying oils. Remarkable progress was made in drying-oil technology due to the pressure of necessity. New and valuable drying oils were developed. This process is still continuing. Most of the properties of China wood oil were duplicated or excelled. However, some of the newer oils had one property peculiar to China wood oil. That was the property of drying hard through, even in relatively thick films, without loss of toughness or adhesion.

Today, we still find many finishers flooding the tops of furniture with varnish and expecting it to dry hard; if not tomorrow, then certainly next week. But they are mistaken. Here is what happens: The heavy coat of varnish sets quickly and the surface seals over. As a result, solvent is trapped underneath and the air can't get in to oxidize the oils. What happens? A slight temperature change at this stage will cause checking. If packed soon, such a film will print. But even if you avoid these troubles, there are others lying in wait.

After a week or ten days, when the varnish may be presumed to be dry, if you will scratch the film you will find it brittle and spongy once the surface is broken through. It mars easily and flakes off without difficulty. The film, instead of shrinking to a hard, dense film, has a porous structure like bread or cake. A normal coat of the same varnish will produce a hard, tough, adherent film, proving that the varnish itself is not unduly brittle.

The moral of this story is simple. If you want to get good results with present-day furniture varnishes, don't put any more on the tops of cases than you do on fronts and ends. If you must have a heavier film on the tops, apply an extra coat rather than attempt to put it all on at once.—R. H. W.

Dr. Price Becomes Technical Director of Oakite Products

Dr. Donald Price, formerly associated with the Interchemical Corp. and National Oil Products Co., author of many technical papers on organic chemistry and well known for his research work on sulphonated oils, wetting agents and detergents, has been

Dr. Donald Price has been made Technical Director of Oakite Products, Inc., New York.

appointed Technical Director of Oakite Products, Inc., New York 6, N. Y., manufacturers of specialized industrial cleaning materials.

Dr. Price will direct activities of the Company's chemical and engineering staff and Research Laboratory in connection with plans to expand its technical service facilities to branches of the metal working industry and in the further development of materials designed for the improved surface preparation of metals. Dr. Price is Vice President of the American Institute of Chemists, Councilor of American Chemical Society, member of the Executive Committee, American Branch, American Institute of Chemists and various professional societies.

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Already YARNALL Technicians are working up on post war finishing problems even though materials required are not immediately available.
Allow YARNALL Laboratories to help you in solving your finishing problems—first for war and next for peace. You will find the co-operation and service gained will justify your inquiries.
For best results with "Flock" use YARNALL Flock Undercoat. Samples and full information furnished upon request.
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Alcohol Fuel? — Our midwest farm states have long dreamed of the day when corn could be converted into motor fuel. A promising step in this direction has been taken by the Vimalert Corp. of Jersey City, N. J. This firm has developed a working alcohol-fuel, 6-cylinder automobile engine which is said to closely resemble the power plant in a late model Chevrolet.

To tie in with this intertsing experiment, the distilling firm of Seagram & Sons is developing a mobile distillery which is expected to produce alcohol right at our grain elevators. Not only would alcohol fuel result from this procedure, but almost half of the grain would be sent back to the farm for livestock feed.

* * *

Television Riddle—From a technical standpoint, television has been ready for some time, but the question is: Who is going to foot the bill? That's the way the whole problem of the industry shapes up in the mind of J. J. Nance, vice-president of the Zenith Corp. He is inclined to dispute some of the over-optimistic predictions being made by others concerning immediate postwar prospects.

Television presents a vicious cycle, Nance points out. "Advertisers can't profitably sponsor good productions until there is a mass audience. We can't get a mass audience until we have provided the American people with assured continuous entertainment." The man who solves this riddle should be rated a public benefactor.

* * *

Barnacle Bills—The well-known editor of *Ships*, Harry Botsford, has an intriguing article on barnacles in *This Month* Magazine. He speaks highly of the United States Navy's new formulation, which is sprayed on the bottom while smoking hot. According to Botsford, a barnacle simply cannot attach itself to such a surface.

"Barnacles have cost ship owners millions of dollars," he writes. "If a ship has been in tropical waters, the growth of barnacles will flourish and reach amazing proportions, slow down the natural speed of the ship and greatly increase fuel consumption."

* * *

Read This and Weep — Our friend, Ernest N. Andrews, of the Sugar Beet Products Co., sends us an amusing item from his firm's publication, *The Digest*. It is a reprint of the rules for employees, drawn up 80 years ago by Carson, Pirie Scott & Co., of Chicago.

Here are a few: All clerks were required to be on duty from 6 a. m. until 9 p. m. Smoking cigars, getting shaved in a barber shop, and other frivolities were forbidden. Everyone had to attend Sunday school regularly. The store recommended, furthermore, that leisure hours be spent in reading.

* * *

Cold Water — Industrial executives constantly rub their hands with glee as they envision a nest-egg of 100 billion dollars' worth of War Bonds that will be available for immediate peacetime spending. Ralph Keller, president of the Chicago Sales Executives Club, has

Hilo No. 916 Black Crystal

(Made with Tung Oil)

AVAILABLE NOW

Many friends of Hilo Crystal responded immediately to the news that this finish was available again. We anticipate no curtailment of the supply, yet war brings quick and unexpected changes. Your order received now—for prompt delivery—will assure you a supply of this sparkling finish.

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taken out his pencil to break down the figures in a factual analysis.

He comes to the conclusion that we have been deluding ourselves over the importance of this savings fund. Keller points out that only eleven billions represent sales of series E bonds, which are bought by the mass of consumers. This figure represents only about one month's wages and salaries for a typical 1944 period. Some of the crystal-gazers may have to revise their sales estimates downward.

* * *

Down to Earth — Some hard-boiled observations on aviation developments were expounded at a recent conference in New York's Town Hall. Frank H. Kelley Jr., of the Bell Aircraft Co., derided those prophets who describe the helicopter as a "cheap, efficient, easy-to-fly, foolproof, jack-of-all trades."

Turning to the jet plane, Kelley added that the greatest drawback is its enormous fuel consumption. He also declared that jet propulsion designs are comparatively inefficient at low altitudes, although extensive research is being devoted to the problem at the present time.

* * *

Versatile Steel—One of the developments we have been reading about for many years is colored steel. Walter Tower, president of the American Iron and Steel Institute, believes we won't have long to wait, and that the innovation will revolutionize finishing procedures in many industries.

He does not seem to be seriously concerned with the threat of competition from plastics, because wartime experience has shown that steel is virtually irreplaceable for many purposes. Among the postwar marvels forecast by Tower are ladies' stockings of sheer steel.

Importance of Sand — With the blast treatment of metals becoming steadily more commonplace, *Science Digest* tells us some interesting sidelights on this subject. In case you don't know it, the most desirable sand comes from the Middle West. Their grains are round, and generally will wear down evenly so they can be re-used many times before wearing out.

On the other hand, we are informed, ordinary bank or beach sands are of limited use. They break up, create dust, and can rarely be re-used. Incidentally, did you know that cereals are sometimes employed in blasting?

* * *

Infra-Red Heating — A newsworthy report on recent progress in the use of infra-red lamps to heat motors is presented by Bert Pierce, automobile editor of the New York *Times*. He describes the experience of the Philadelphia Transportation Co. after a full season of tests in outdoor parking lots. The striking figures show that about 5000 gallons of gasoline were saved, and about 5000 engine operating hours.

In the Philadelphia tests, parking berths were laid out for 27 buses in temperatures running as low as 2° F. Small pits were equipped with four 250-watt infra-red lamps each. The engines started better and required less checking than those stored in garages with temperatures up to 40° F.

* * *

Shaping Up Sales—With a potential demand for over 12 million new cars generally conceded in the immediate postwar period, Graham-Paige is wasting no time in lining up dealers for the sales campaign. According to board chairman Joseph W. Frazer, franchise awards of a nation-wide network

Just for the Record

REMEMBER THESE NAMES

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The favorite of users everywhere to guard against paint spray vapors and nuisance dusts! Made of soft, high grade rubber, foldable, reversible, fits any shaped face. Equipped with face cloth, it presents the utmost in comfort. Weighs only 4 oz. Does not hinder conversation. Price $19.80 doz.

Sample $1.65 pp.

H. S. COVER, South Bend, Indiana

of 1200 distributors is getting under way.

Graham-Paige intends to build at least 350 cars daily in the first year of peacetime production. Current plans call for a six-cylinder, 100-horespower lightweight car which will range "next to the lowest in price." The company also intends to feature a wide variety of farm implements — including tractors, roto-tillers, cultivators.

* * *

Outlook on Paints — All indications point to an increasingly tightened supply of paint materials for the next few months. There is an estimated shortage of 10,000 tons a month in the country's lead supply. Red lead stocks are not as inadequate as the white variety; it is the latter which is as scarce as your favorite brand of cigarettes. The shortage of white lead means poorer quality for many paint products.

The drastic cut in linseed oil stocks is causing concern in many other lines of industry. With added problems in packaging, the lot of the average paint factory head is not a happy one.

* * *

For Visitors — Free tickets to many leading radio broadcasts are available to readers of INDUSTRIAL FINISHING. Among the cooperating sponsors are: Gulf Oil Corp., Prudential Insurance Co. and Edelbrew Brewery. When planning to visit New York, drop a line to: *Lawrence H. Singer, 130 West 86 Street, New York 24, N. Y.*

Among the recent arrivals on Broadway worthy of your attention are the following shows: "Hope For the Best," a bright comedy starring Franchot Tone; "One-Man Show," Jed Harris' superb dramatic production; and "Up In Central Park," a sparkling new musical.

Bright Colors Promote Shop Safety

SPOTLIGHT painting, a plan to get vital and hazardous parts of machinery into conspicuous colors, has paid dividends in the Liberator bomber modification plant operated by Northwest Airlines at the St. Paul, Minn., Airport.

L. E. Koerner, superintendent of overhaul for NWA, credits it with reducing accidents, speeding up the work of new mechanics, lessening eye strain and promoting efficiency in general.

"A study on safety and efficiency conducted last November revealed that a large percentage of all injuries at the plant occurred while mechanics were climbing in and out of planes," said Koerner. "So we decided to do something about it."

The number of accidents declined, he said, after ladder rungs and standing areas were painted a conspicuous color to catch the eye of hurrying workers.

One success led to additional experiments. Step No. 2 was the application of red paint to electric switches and other controls; this promptly eliminated groping and thus saved valuable seconds.

A full program of "color aids" then was undertaken in the machine shops, where work is done on NWA commercial planes.

"The dull gray of most machinery has a tendency to absorb and kill natural color," Koerner explained, "so we adopted colors that would reflect this light, and the shops became pleasantly brighter.

"We noticed that eye fatigue and general strain lessened when we eliminated the monotony of that single gray color which acted as a camouflage against the dull background of the floors and walls."

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Applied to almost any surface, the finely cut particles of flock are used to transform materials in many ways for many purposes.

FUNCTIONAL

Used in airplane, auto and numerous other industries for—

SOUND DEADENING — TEMPERATURE INSULATION — INTEGRAL GASKETS — SHOCK ABSORBING SURFACE — NON-MAR SURFACE PROTECTION.

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Applied in various lengths and colors to wood, paper, cloth, metal, etc., the following effects are produced—

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GEN. DOUGLAS MacARTHUR kept the faith with the people of the Philippines when he restored the civil Government of the Islands to their President, Sergio Osmena on February 27th.

This is the culmination of a promise he made three years ago when he was ordered to leave Corregidor for Australia. His military campaign from Port Moresby, Australia to Manilla on Luzon has been described by military experts as an operation of tactical perfection.

All of us on the home front can feel proud of our part in producing the arms and equipment that made his return possible.

Listed here are a few of the war products now being coated with our materials. Phone, wire or write and let one of our finishing experts help you "keep production rolling."

BACK THE ATTACK . . . . . BUY WAR BONDS

The Lawrence-McFadden Co.

Headquarters for Fine Finishes Since 1875

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He said that the dressed-up appearance of the shop acquired through its gay colors developed a tendency in the workers to maintain cleanliness through the whole working area.

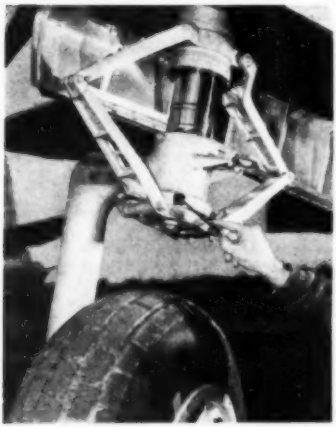
NWA now is planning similar painting throughout its entire system.—F. CIPOLON.

Colored Marks Are Useful Guides

IN THE plant of Glenn L. Martin Co., Baltimore, Md., breakage of nose-wheel stops and scissors on B-26 Marauders, due to too sharp turns on the part of tractors towing the airplanes, has been almost completely eliminated by the painting of limit marks at the base of the landing gear struts.

The stationary and turning marks are so placed that they come together, forming a continuous line at a point 5° short of the stop. The marks are painted red and are easily visible to the tractor operator who knows that he has reached the limit when he sees the two marks come together.

This simple expedient was suggested by Venton Ferrell, a leader in Ground Test at the Martin Airport, and is today being used on all B-26 Marauder aircraft.



Pointing out the limit marks which are now painted on the nose wheel of B-26 Marauders to warn tractor operators when they reach the turning limit while towing these bombers.

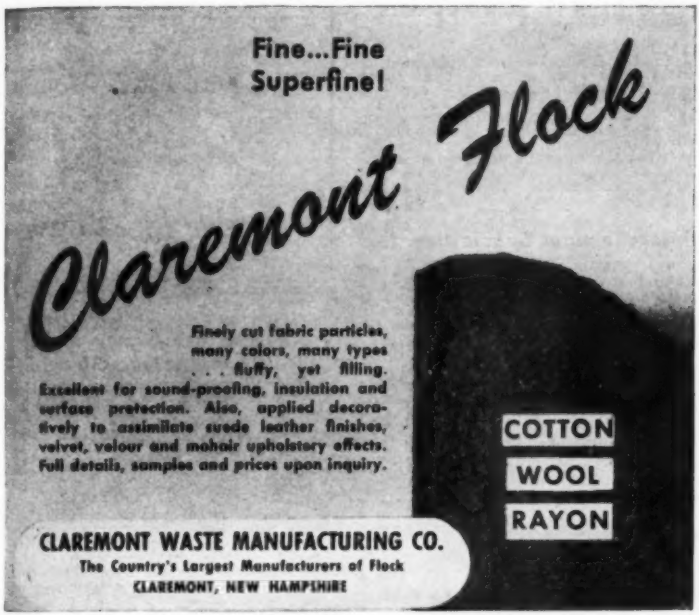
Nitrocellulose

THE good qualities of nitrocellulose have been demonstrated many times through the past three-quarters of a century. This product was used in making the first of a long list of new plastics. That first plastic was celluloid (invented in 1868) which continues to be made in volume because of its many outstanding qualities.

Nitrocellulose has pioneered many peacetime products. Some of these it has passed on to other materials, as in the case of the plastic layer in safety glass; many others it continues to serve, as in plastics, and also in lacquer which is still the fastest-drying finish known.

Nitrocellulose lacquers are used on airplanes, automobiles, furniture, toys, hardware, brush handles, novelties, and for many other varied uses. Coated textiles are finished with nitrocellulose compositions, and leather is coated with nitrocellulose lacquer emulsions. Paper is coated with these lacquers for both protection and decoration. Adhesives and household cements for many uses have nitrocellulose as the basic ingredient.

Plastics made of nitrocellulose are the toughest of all thermoplastics; they are crystal-clear, long-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lasting, and have excellent dimensional stability and resiliency; they have good resistance to water, oils, and chemicals. Plastics based upon nitrocellulose are low in cost, easy to fabricate, and unlimited in color effects. Nitrocellulose plastic is the standard for billiard balls, fountain pens, high-grade spectacle frames, drawing instruments, and other items, because of its unparalleled qualities.—From *Chemicals for Industry.*

A new 2-decade electronic counter, designed for industrial and laboratory uses, is announced by the Potter Instrument Co., 140 Roosevelt Ave., Flushing, N. Y.

"Wearproof" Pump Bulletin

A new 4-page illustrated bulletin that tells you about certain types of industrial pumps (sludge pumps, for example) can be obtained free by writing Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.

Luther C. Robey Joins Jones-Dabney Co.

Mr. L. C. Robey, formerly with the Lane Co., Alta Vista, Va., is now a member of the Wood-Finishing Division of Jones-Dabney Co., Louisville, Ky. Mr. Robey has had extensive experience with modern finishing materials and conveyorized furniture production. He has seen the results of technical progress from slow-drying water stains to non-grain-raising stains; from shellac to highly synthetized lacquer sealers and lacquer topcoats; from slow-drying varnishes to the new conversion type varnishes and synthetic baking finishes.

Standard Varnish Appoints Carlson

E. M. Carlson has been appointed as sales and service engineer of the Eastern Pennsylvania territory for the Standard Varnish Works, Staten Island, N. Y. Mr. Carlson brings to the industrial finish department a broad background of experience in protective coatings for industrial applications and uses. He may be reached at 800 Warren St., Willow Grove, Pa.

Interchemical Specialties, Inc.

Interchemical Specialties, Inc., of Bound Brook, N. J., a wholly-owned subsidiary of Interchemical Corp., is conducting the manufacture, sales and servicing of chemical specialties for the chemical coatings field.

Mr. Pittman, President of Interchemical Corp., is also President of Interchemical Specialties, Inc. Direct operations are under the immediate supervision of Mr. A. Saunders, a Vice-President. Interchemical Specialties, Inc., anticipates that postwar operations will extend to numerous other similar products.

Remove Production Line Dust, Lint, and Sand Particles with this Soft Tacky Cloth before applying finish.

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Gross Lots Available Thru Paint Dealers or from the Processor.

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Infra-Red Ray Lamps

Best for Infra-Red Ray Baking and Drying

Carbon Filament Lamps, service proven, available in Inside-Silvered (self-reflecting) or in Clear Glass types. Write for details.

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Booklets Catalogs Circulars

Revised Tabl-Spray Metal Washing Machine Circular

Bulletin No. 19 which describes the American Tabl-Spray metal-washing machine manufactured by American Foundry Equipment Co., 555 S. Byrkit St., Mishawaka, Ind., has been revised to incorporate new developments in the equipment.

This metal-washing machine is designed to meet the need for high-speed washing of flat, fragile work or circular parts with intricate pockets and crevices. Parts to be cleaned are placed on a mesh table in a totally enclosed cabinet and rotated through high pressure spray solutions, discharged from special machined non-clogging nozzles.

Fluid Handling Equipment

J. A. Zurn Mfg. Co., Erie, Penna., has recently published its Fluid Handling Equipment Catalog No. 45, which describes a complete line of tested devices for the protection of operating equipment connected with the piping systems utilized in industrial plants. It includes suction and pressure line fittings such as duplex vertical and horizontal chamber-type strainers, "Y" strainers, angle-type strainers, 90° offset pressure, 180° straight-through pressure strainers, and remote valve control assemblies.

Color Power for Industry

Here are 20 pages 8½x11-in. in full color, with text and illustrations about various colors as they apply in industry. Subjects treated: Tired eyes make tired workers; What makes eyes tired; Bring Nature indoors; Compliment your lighting; Too much "Brightness Contrast"; Optonic colors; Increase Employee Efficiency; Provide a Safer plant; Promote Sanitation; Harmonious Colors, etc. Contrasts are

Just Daub It On and Scrape It Off

That's all there is to keeping your spray booths clean. A boy with an old brush and a wide putty knife can recondition any spray booth, tunnel walls and fan blades in a couple of hours with . .

DOSTER BOOTH KOTE

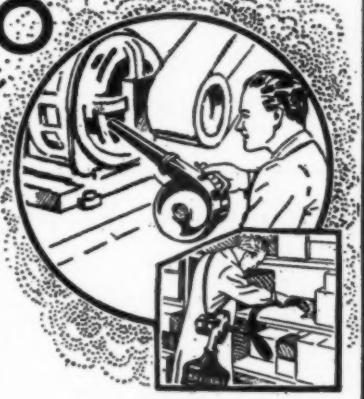
This tested and approved protective coating for spray booth walls is an excellent time, work and money saver in every spray room. Daubed on clean walls with an old brush—scraped off, with its overspray paint load as easy as peeling an orange. Try it once—you'll never be without it.

Doster Booth Kote in 5 gal. kits—$6.25 F. O. B. Chicago

DOSTER & COMPANY, 4840 W. Superior St., CHICAGO 44, ILL.

Makers of TEXKIN, the Invisible Glove Skin Protector containing Lanolin.

TORNADO settles your DUST problem



DUST will be LESS of a problem with the TORNADO Portable Electric Blower to blow it out of motors, generators, shafting, bearings, etc. TORNADO blows out dust, dirt, lint—with its swoosh of clean, dry air.

Powerful 1 h.p. universal motor makes it easy to clean largest motors or generators without dismantling them. Plugs in at any electric outlet. Costs less than 3c an hour to operate. Weighs only 14 lbs.

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shown between clear subdued brightness and dim non-contrasting areas on machines and in factories, offices, homes and stores.

The book is printed on high quality white paper and is spirally bound. Copies are free. Write The Arco Co., 7301 Bessemer Ave., Cleveland 4, Ohio, or Arco Co. of California Ltd., 745 E. 59th St., Los Angeles 1, Calif.

Folder on Glass Tanks

Are you interested in glass tanks or glass-lined steel tanks for hot acids, etc.? If so, write for the 4-page illustrated folder entitled "Glass Tanks". It is distributed by Pittsburgh Plate Glass Co., Grant Building, Pittsburgh 19, Penna.

Metal Cleaning Bulletin

The Optimus Equipment Co., 209 Church St., Matawan, N. J., manufacturers of washing, rinsing, pickling and drying equipment for metal parts, has just issued Bulletin 4E2, entitled, "Batch Cleaning in Portable Metal Washing Machines for Production Maintenance and Repairs." This illustrated bulletin describes portable machines of the dip-agitating type (single and double load) and the spray type. All of these machines can be used for cleaning, washing, paint stripping, rust prevention, rustproofing, rinsing, chemical treatment, coating, etc.

MISKELLA
INFRA-RED OVENS & APPLIANCES
INSULATED - REFLECTIVE - SECTIONAL
BY
INFRA-RED ENGINEERS & DESIGNERS
1868 E. 40th STREET — CLEVELAND, OHIO

Thermostatic Control Booklet

For safe, accurate, automatic control of temperatures up to 650°F., seven types of bi-metal thermostats to fill a wide range of applications are described in a new booklet announced by Westinghouse Electric & Mfg. Co., Pittsburgh 30, Penna.

Industrial Cleaning Bulletin

A new Bulletin (No. 4E1) has just been published by the Optimus Equipment Co., 309 Church St., Matawan, N. J., manufacturers of washing, rinsing, pickling, and drying equipment for metal parts. This bulletin describes a complete manufacturing and engineering service, covering units from the smallest portable type to complete automatic equipment including an entire series of metal cleaning and allied process operations.

Color Code for Safety

"Color Code for Safety" is the title of the 16th folder in the Color Facts series issued by the Eagle Printing Ink Co., Division of General Printing Ink Corp., 100 Sixth Ave., New York 13, N. Y.

While color has frequently been used for safety, many of its applications have been inconsistent and confusing. The Du Pont Code illustrated in this

BOOKS On Finishing Available

"CHEMICAL FORMULARY" (Vol. VI)	$6.00
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"LACQUER AND SYNTHETIC ENAMEL FINISHES"	5.50
"SPRAY PAINTING—Industrial and Commercial"	1.50
"FURNITURE FINISHING" (543 Pages)	4.00
"NATIONAL PAINT DICTIONARY"	7.50
"PYROXALIN ENAMELS AND LACQUER" (253 pages)	3.50
"PAINT LABORATORY NOTEBOOK"	2.75

Cash Must Accompany Orders

INDUSTRIAL FINISHING, 1142 N. Meridian St., Indianapolis 4, Indiana

folder offers an opportunity to standardize safety practice and to let industry at large benefit from a uniform and meaningful symbolism.

There is no charge for this folder; to obtain your copy write to the Eagle Printing Ink Co., Division of General Printing Ink Corp.

Cold-Rolled Paintgrip

A 12-page illustrated booklet gives users of sheet steel some interesting information about Armco cold-rolled "Paintgrip" steel. The steel sheets are given an electrolytic "flash" of zinc and then Bonderized at the mill. When your products are formed or drawn to shape, the surface of Armco cold-rolled Paintgrip is ready for paint. For a free copy write The American Rolling Mill Co., 703 Curtis St., Middletown, Ohio.

Industrial Rubber Gloves

A new catalog section on its all-synthetic industrial rubber gloves has been published by The B. F. Goodrich Co., Akron, Ohio, and is now available upon request. Feature is a page devoted to illustrated instructions on how to get the most service at the lowest cost from acid and industrial rubber gloves. Methods of manufacturing the gloves by the Anode process, which gives the same advantages with all-synthetic construction as when natural rubber was used, are described. A page is devoted to the company's line of plastic treated industrial aprons.

Synthetic Wax Booklet

A 16-page booklet of information about a high-melting point synthetic wax that has hundreds of industrial uses—uses of interest to finish users and finish manufacturers—has been published by Glyco Products Co., Inc., 26 Court St., Brooklyn 2, N. Y. Send for the copy identified as Acrawax C.

Arco Guide Simplifies Color Selection

A new and simple color selection guide, which permits persons without detailed technical understanding of color science to specify correct color shades that minimize fatigue and promote safety, has just been published by The Arco Co., Cleveland, Ohio. Developed for use in industrial, com-

PRESTO
EST. 1915

SAFE - FAST - CLEAN

FIREPROOF REMOVER—
The safest remover available —removes old surfaces and fire hazards.

PRESTO LIQUID REMOVER—
The fast acting remover— destroys old finishes in 20 minutes.

PRESTO MAGIC REMOVER—
The cream remover—clean cutting, rapid—for horizontal or vertical work.

PATTY REMOVER AND CHEMICAL CORP.
19 Gay St. Manhattan 14, N. Y.

REGOLAC

A new line of finishes for wood and metal surfaces. Made by the manufacturers of world famous Titanine Aircraft Finishes—.

DIVISION OF TITANINE INC.
Union, New Jersey

mercial and institutional interiors, the method enables anyone confronted with a painting job to make his own selections on a scientific basis which insures the maximum benefits obtainable through the use of color.

"We have reduced the answers to all the usual color selection problems to 18 short and simple rules which anyone can understand," Howard E. Wise, Arco president, explained. "These rules relate directly to the colors in our 'Optonic' system, including five shades of accurately measured reflection value in each of five colors —blue, green, tan, coral and gray, but they apply to all color selection work."

National Fire Codes for Flammable Liquids, 1945

This 592-page volume, recently published by the National Fire Protection Association, appears at a time when war demands are for increasingly larger quantities of materials whose fire and explosive hazards involve great danger to human life and property. The book assembles for the convenience of the reader the many standards dealing with these hazards. Superseding the National Fire Codes for Flammable Liquids, Gases, Chemicals and Explosives for 1943, the new volume contains up-to-date information on new chemicals and solvents used in war industries, including information on their fire hazard properties and the best method of fire extinguishment. In addition, there are six new or revised codes.

This new volume is divided into 9 parts as follows: Flammable Liquid Storage and Handling; Oil and Gasoline Burning Equipment; Liquified Petroleum Gases; Utilization of Flammable Liquids; Gases; Refrigeration and Fumigation; Explosive and Nitrocellulose Materials; Tables of Properties—Hazardous Chemicals, Flammable Liquids; Flash Point Tests.

The book contains many tables and drawings. Page size, 6x9-in., bound in substantial red cloth covers. Price $3.00 per copy postpaid. National Fire Protection Association, 60 Batterymarch St., Boston 10, Mass.

INDUSTRIAL
BLANCHIT
(Reg. U. S. Pat. Off.)
CABINET-FURNITURE MAKERS'
WOOD BLEACH
Also For
Interior Woodwork Refinishing
L. R. van Allen Co.
Patent Licensee
CHICAGO 54.

DUST AND LINT
ARE THEY SLOWING UP YOUR PRODUCTION? IF SO,
Detroit Handy Tac Rags
will solve your problem. Remain tacky indefinitely. Non-combustible. At your Paint Dealer or write to Manufacturer.
DETRO SALES CO.
418 NORTH SAN PEDRO STREET
LOS ANGELES 12, CALIF.

Plant Electric Lighting Booklet

The Wabash Appliance Corp., manufacturers of reflector-type lamps for industrial and commercial lighting installations has prepared a special booklet for lighting engineers, featuring a set of charts containing illumination values based on various spacings and mounting heights.

In addition to this valuable data, information on reduction of maintenance cost and attaining peak lighting efficiency is contained therein. For a free copy, write Wabash Appliance Corp., Birdseye Lamp Sales Division, 345 Carroll St., Brooklyn 31, N.Y., requesting booklet No. 1-545.

Book of "Chemicals for Industry"

A handy pocket-size booklet containing the list of chemicals made and sold by Hercules Powder Co.'s Cellulose Products Department, types available, their end uses, and pertinent packing and shipping information is now available from that department.

Titled "Chemicals for Industry," the booklet is designed as a useful aid to technical and non-technical persons interested in the use of these products in plastics, films, lacquers, adhesives, varnishes, chlorinated rubber, printing inks, and for the flameproofing, waterproofing, and weatherproofing of textiles.

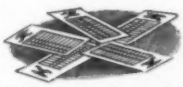
The chemicals listed include nitrocellulose, cellulose, acetate, and ethyl cellulose—bases for the largest thermoplastic family in industry; Parlon, Hercules chlorinated rubber; Clorafin, Hercules chlorinated paraffin, and CMC (sodium carboxymethylcellulose).

TO COMPANY PRESIDENTS:

Today—thanks largely to you and other industrial executives—22,000,000 civilian workers are speeding victory and achieving postwar security through the Payroll Savings Plan. Over 60% of the 6th War Loan subscriptions came from this source—and, between drives, this forward-looking plan has been responsible for 3 out of 4 War Bond sales!

Good as this record is, the Payroll Savings Plan can be made more effective by giving Bond buyers a definite idea of the many benefits accruing to them. To accomplish this the War Finance Division has prepared a variety of active aids—*an entertaining moving picture, an interesting booklet and a handy War Bond envelope.*

Passing this particular "ammunition" requires that you reappraise your own company's Payroll Savings Plan. Have your own War Bond Chairman contact the local War Finance Committee—today! They will welcome the chance to discuss this new program with you.



The Treasury Department acknowledges with appreciation the publication of this message by

INDUSTRIAL FINISHING

This is an official U. S. Treasury advertisement prepared under the auspices of Treasury Department and War Advertising Council

Valuable Preprite Bulletin

A 6-page illustrated bulletin about "Preprite" corrosion-retarding phosphate coatings for manual application to large bulky surfaces before painting, is being distributed by Neilson Chemical Co., 6564 Benson St., Detroit 7, Mich.

"Preprite" forms a paint-receptive rust-retarding phospate coating on iron and steel surfaces. "Preprite" can be brushed on or it can be applied by flow-coating or dipping.

New Paint Reflects Light (Has Tiny Glass Spheres)

Originating in 3-M Co's. laboratories, "Scotchlite" was first introduced as a safety-aid in night driving—coated on highway markers, guard rails, bridge abutments and railroad cross bucks. It is made of tiny glass spheres, approximately 5000 to the square inch on a synthetic resin film. During the day the sign or marker coated with "Scotchlite" has its customary appearance, but at night, when a light is played on the coated surface, it sends back light in a glareless reflection which gives the coated object its daytime appearance.

Like other 3-M products, "Scotchlite" has gone to war, and now is used on air field and harbor and buoy markers, oars in pneumatic life rafts, in military signaling operations, striping of ammunition trucks, and for other strictly war safety uses. Standard Army signs, for example, are made of "Scotchlite." Postwar-wise, the potentialities of this product include commercial advertising signs, among many others.

Bert S. Cross, new products manager for the past two years, has been named general manager for the "Scotchlite" division, of Minnesota Mining & Mfg. Co., St. Paul, Minn. With this appointment 3-M Co. launches this reflective material, one of its newer products, on a full-scale basis.

Classified Advertising

Rate: 50 cents per line per insertion—minimum $1.50

SALESMAN WANTED.

Nationally-known manuacturer and distributor of furniture finishing supplies and hardware, requires experienced sales producer for West Coast territory. Substantial number of active accounts thru-out entire territory will be turned over to successful man. This is an unusual opportunity for a life-time connection with a strong, progressive organization of sound business minds and practice which is planning for the future postwar years as well as the present. Address IF-178, care Industrial Finishing.

STAIN MAN WANTED.

Person who has some experience in stain manuacturing. Want a man who can take complete charge of manufacturing or who can be trained to take over. Outline age, background and experience and salary desired. Write—W. A. BECK, The Glidden Company, Adams & Elting Division, 1833 S. Normal Ave., Chicago 16, Illinois.

WANTED

Sales engineer with chemical education to head our Sales Promotion Dept. Would prefer a man with some laboratory experience in formulating, or research work along paint and varnish lines. We want a man to coordinate the work of the laboratory and sales department, and to help the salesmen in handling technical problems that may arise in connection with their accounts. Address IF-180, care Industrial Finishing.

SALESMAN WANTED

For Cleveland office of a national manufacturer of raw materials for paint, varnish and allied industries. Sales ability and personality more essential than technical training. Excellent future for the man who can qualify. Send photograph and complete details of past experience. Our employees know of this advertisement. Address IF-174, care Industrial Finishing.

POSITION WANTED

As Industrial Salesman. Can furnish good reference and proof of ability to either sell, formulate or manufacture any type industrial finish. Wish sales work only, with modern up-to-date concern who needs a capable paint technician to handle large accounts on commission only. Prefer midwest; will consider east. Address IF-179, care Industrial Finishing.

FINISHING ROOM FOREMAN

Wanted by furniture manufacturers of Bedroom and Sun Room furniture. Excellent opportunity for present and postwar. Give full details. Address IF-181, care Industrial Finishing.

POSITION WANTED

As salesman of industrial finishing materials. Have had five years' experience. Address IF-182, care Industrial Finishing.

STAIN AND FILLER MAN WANTED.

Long established independent manufacturer of industrial finishes wants capable man as head of Stain and Filler Department. Write fully as to experience, age, etc. Address IF-173, care Industrial Finishing.

WE BUY DIRTY SOLVENTS.

Don't throw away spent cleaning thinner, degreaser residues, etc. Send us a sample for quotation. We also reclaim for customers. DYTEX CHEMICAL CO., 267 Plain, Providence, R. I.

BAKING ENAMEL SELLOUT.

110 — 55-gal. drums Du Pont Black Baking Enamel @ 75c.
66 — 55-gal. drums Forbes Grey Baking Primer @ 65c.

In excellent condition. All or part. No priorities required. RAND CHEMICAL PRODUCTS CO., 2335 So. Mich. Ave., Chicago 16. Phone CALumet 2866-67.

CRYSTAL LABORATORIES

643 Virginia St., Crystal Lake, Ill.

Formulating and Manufacturing
Spray Booth Compounds — Cleaning Compounds
Dry Booth Coatings
Industrial Skin Creams
Farm Chemicals

Spare Time Available

WANTED
ELECTRO-PLATING AND FINISHING EXPERT

Thorough knowledge and broad experience in electro-plating and metal finishing processes. Wanted to work with well established sales and service organization manufacturing products extremely essential in all kinds of production, processing and maintenance work. Location, N. Y. C. Must be willing to travel. Permanent. Give full details. Address IF-176, care Industrial Finishing Magazine, Indianapolis 4, Ind.

POSITION AVAILABLE AS—
DIRECT FACTORY FIELD REPRESENTATIVE

Manufacturer of industrial equipment seeking services of man with practical experience in all types finishing and coating processes. Position requires individual with practical background involving good working knowledge of finishing materials and their application under present day method. Ample training provided. Excellent opportunity for steady employment at attractive salary. Must be willing to travel. While facilities now largely devoted to war effort, this is not an opportunity created by or dependent on war work. Interview can be arranged by submitting full information together with recent photograph to IF-177, care INDUSTRIAL FINISHING, Indianapolis 4, Ind.

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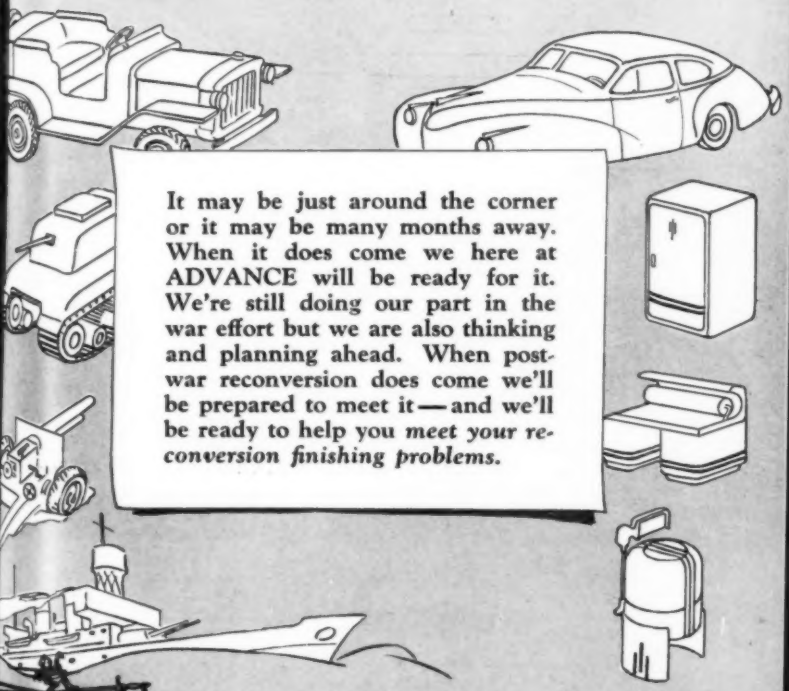
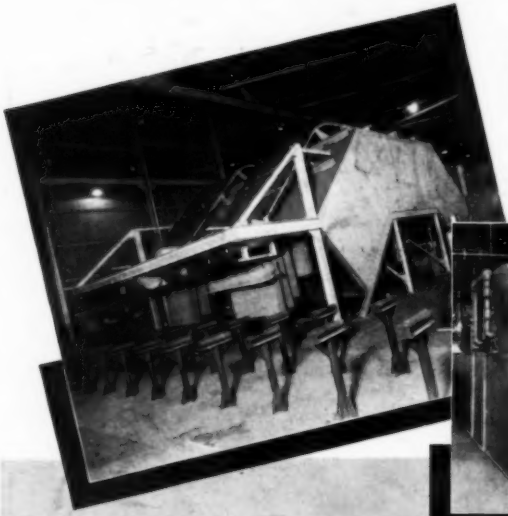


It may be just around the corner or it may be many months away. When it does come we here at ADVANCE will be ready for it. We're still doing our part in the war effort but we are also thinking and planning ahead. When post-war reconversion does come we'll be prepared to meet it — and we'll be ready to help you *meet your reconversion finishing problems.*

ADVANCE PAINT COMPANY

Manufacturers of Wood & Metal Finishing Materials

INDIANAPOLIS, INDIANA



Left Photo: One of the largest "A" Type Conveyor Ovens ever built. Installed in large southern Steel Mill.

Lower Photo: Drying oven installed at Estate Stove Co., reduced cost and improved quality of product.

KIRK AND BLUM
INDUSTRIAL OVENS

SPEED WARTIME PRODUCTION

In plants throughout the nation, Kirk & Blum drying and baking ovens are turning out faster and better product finishing, stepping up rate of production, reducing fuel and labor costs—and very important, conserving manpower by promoting maximum safety.

Whatever your finishing problem may be . . . no matter how large or small your product . . . experienced Kirk & Blum Engineers are prepared to design a complete, properly coordinated drying or baking system that will do a BETTER finishing job—at LOWER COST.

SEND FOR ANY ONE OF THESE BOOKLETS:

- "Industrial Ovens"
- "Dust Collecting Systems in Metal Industries"
- "Blower Systems for Woodworking Plants"
- "Fan Systems for Various Industries"
- "Cooling Systems for the Glass Industry"
- "Data on Kirk & Blum Production Facilities"

THE KIRK & BLUM MANUFACTURING CO.
AN ORGANIZATION OF ENGINEERS AND MECHANICS
2831 SPRING GROVE AVE. CINCINNATI, OHIO